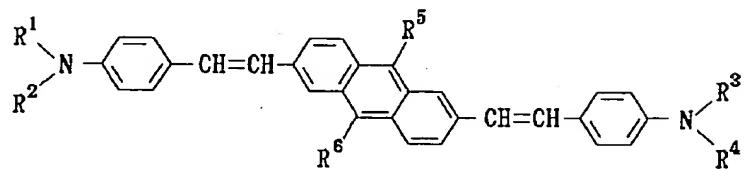


What is Claimed is:

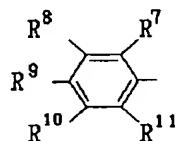
1. A bis(aminostyryl)anthracene compound represented by the general formula [I], [II], [III], or [IV] below.

General formula [I]



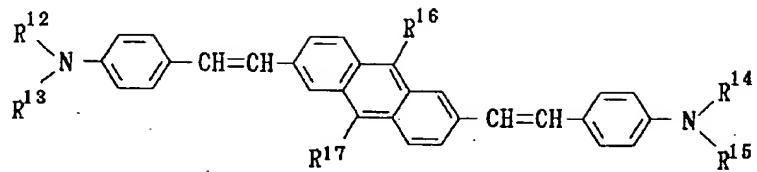
(where R² and R³ each denotes an unsubstituted aryl group, and R¹ and R⁴ each denotes an aryl group represented by the general formula (1) below.)

General formula (1)



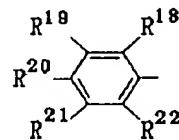
(where R⁷, R⁸, R⁹, R¹⁰, and R¹¹ are identical or different groups, at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group having at least one carbon; and R⁵ and R⁶ are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [II]



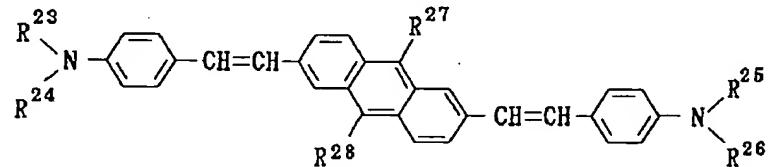
(where R^{12} , R^{13} , R^{14} , and R^{15} are identical or different groups, each denoting an aryl group represented by the general formula (2) below.)

General formula (2)



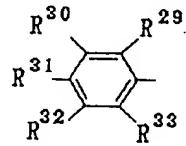
(where R^{18} , R^{19} , R^{20} , R^{21} , and R^{22} are identical or different groups, at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group having at least one carbon; and R^{16} and R^{17} are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [III]



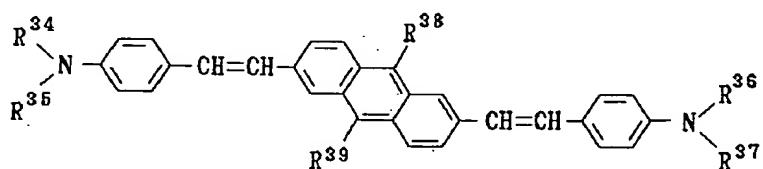
(where at least one of R²³, R²⁴, R²⁵, and R²⁶ denotes an aryl group represented by the general formula (3) below, with the remainder being an unsubstituted aryl group.)

General formula (3)



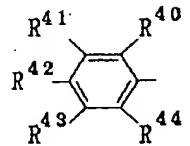
(where R²⁹, R³⁰, R³¹, R³², and R³³ are identical or different groups, at least one of them being a saturated or unsaturated hydrocarbon amino group; and R²⁷ and R²⁸ are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [IV]



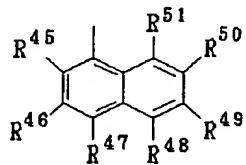
(where R³⁵ and R³⁶ are identical or different groups, each denoting an aryl group represented by the general formula (4) below.)

General formula (4)



(where R⁴⁰, R⁴¹, R⁴², R⁴³, and R⁴⁴ are identical or different groups, each denoting hydrogen or at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group having one or more carbons; and R³⁴ and R³⁷ are identical or different groups, at least one of them being an aryl group represented by the general formula (5) below.)

General formula (5)

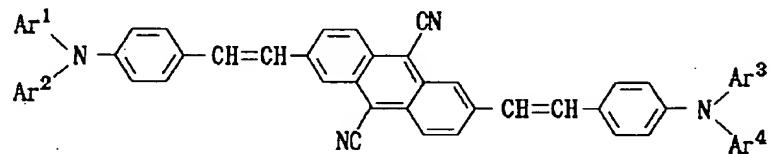


(where R⁴⁵, R⁴⁶, R⁴⁷, R⁴⁸, R⁴⁹, R⁵⁰, and R⁵¹ are identical or different groups, each denoting a hydrogen atom or at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group, or hydrocarbon amino group having one or more carbons; and R³⁸ and R³⁹ are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group,

trifluoromethyl group, or halogen atom.)

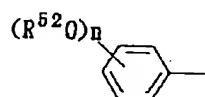
2. A bis(aminostyryl)anthracene compound represented by the general formula (6) below.

General formula (6)



(where Ar¹, Ar², Ar³, and Ar⁴ are identical or different, each denoting an aryl group which may have a substituent, and if a substituent is present, said aryl group being one which is selected from aryl groups represented by the general formula (7), (8), (9), (10), (11), (12), (12'), or (12'') below.

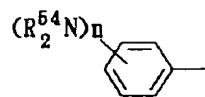
General formula (7)



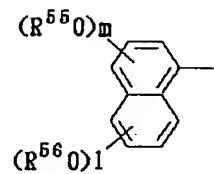
General formula (8)



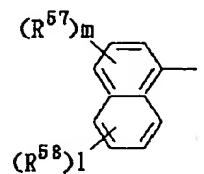
General formula (9)



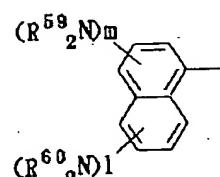
General formula (10)



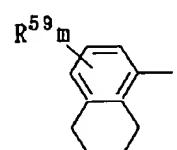
General formula (11)



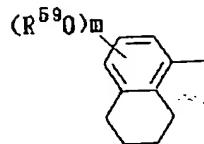
General formula (12)



General formula (12')



General formula (12")

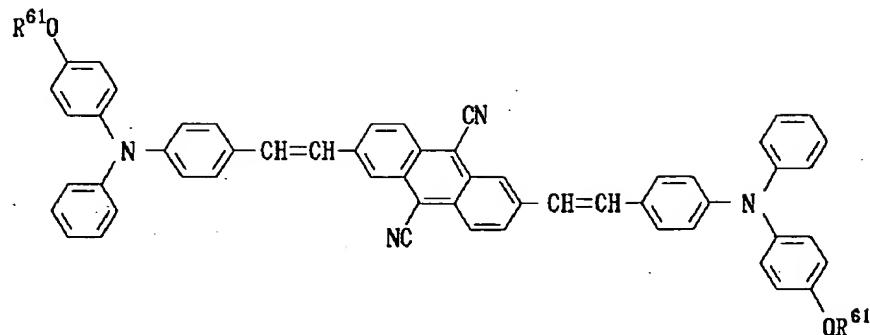


(where R^{52} , R^{53} , and R^{54} each denotes a saturated or unsaturated hydrocarbon group having one or more carbons; R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} are identical or different, each denoting a saturated or unsaturated hydrocarbon group having one or more carbons; n is an integer of 0 to 6; m is an integer of 0 to 3; and l is an integer of 0 to 4.)

3. A bis(aminostyryl)anthracene compound as defined in Claim 2, wherein R^{52} , R^{53} , R^{54} , R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} each has a carbon number of 1 to 6.

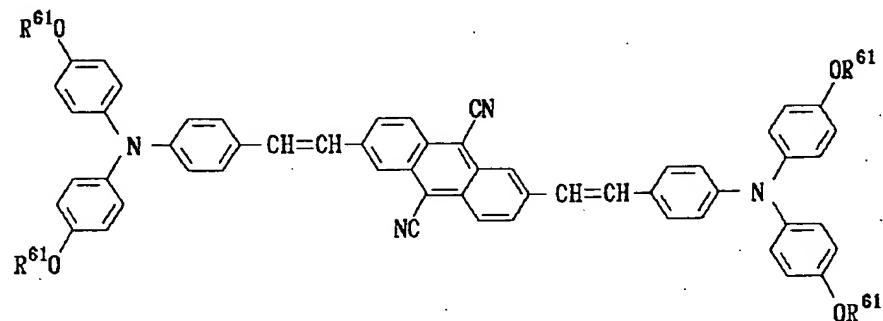
4. A bis(aminostyryl)anthracene compound as defined in Claim 1 or 2 which is represented by the general formula (13), (13'), (14), (15), (16), (17), (17'), or (17") below.

General formula (13)



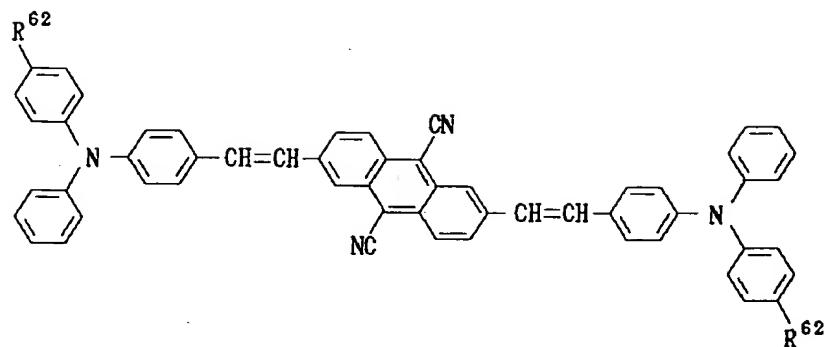
(where R⁶¹ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (13')



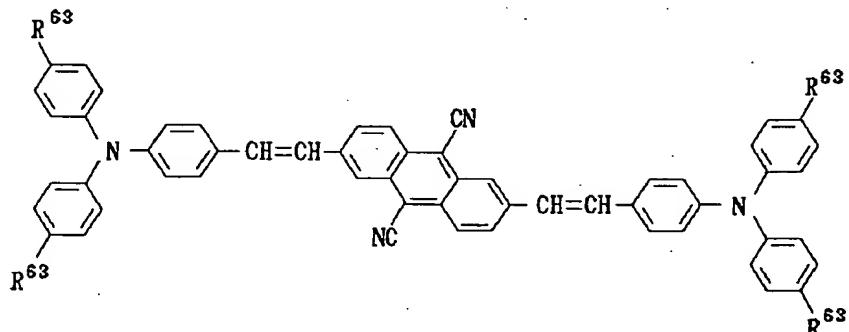
(where R⁶¹ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (14)



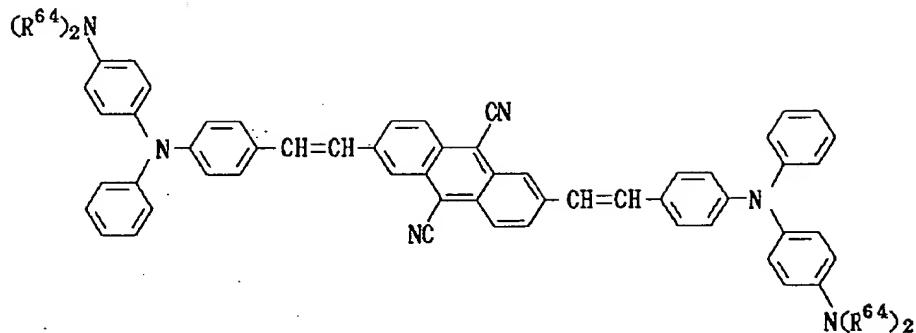
(where R⁶² denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (15)



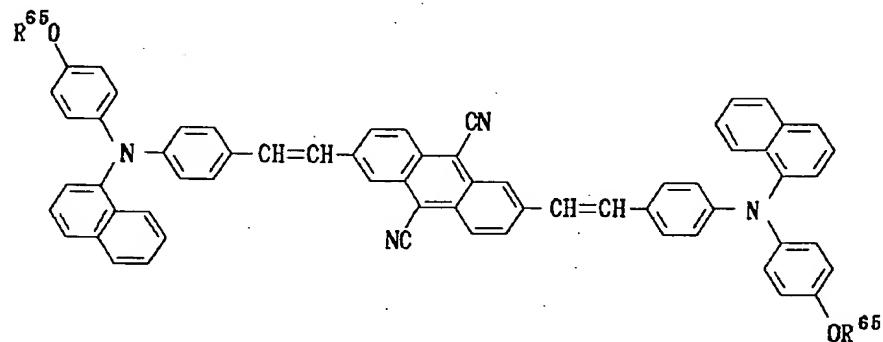
(where R⁶³ denotes a saturated or unsaturated hydrocarbon group or hydrocarbon oxy group having 1 to 6 carbon atoms.)

General formula (16)



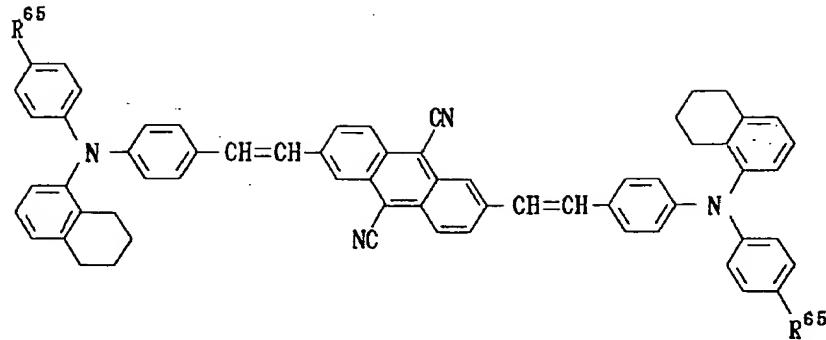
(where R⁶⁴ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (17)



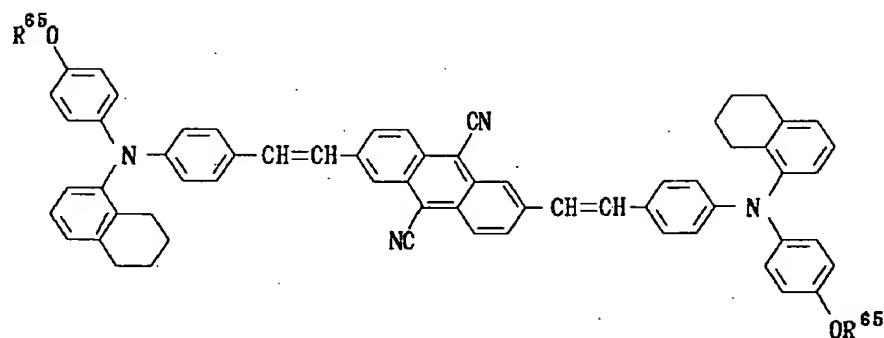
(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (17')



(where R⁶⁵ denotes a hydrogen atom or a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (17'')

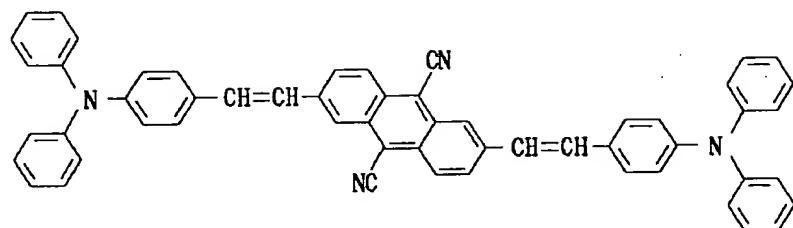


(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

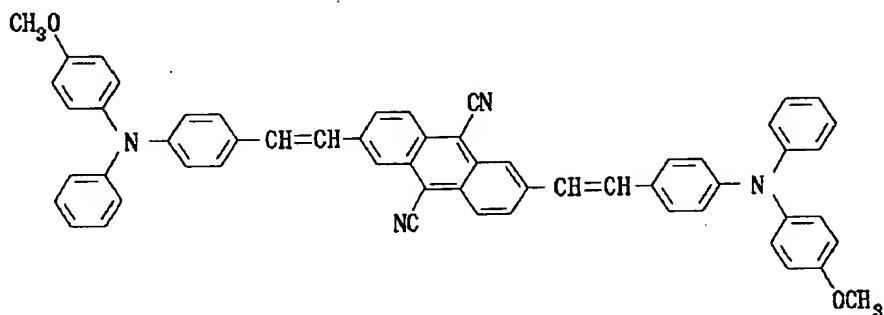
5. A bis(aminostyryl)anthracene compound as defined in Claim 1 or 2 which is represented by the structural formula (18)-1, (18)-2, (18)-2', (18)-3, (18)-

4, (18)-5, (18)-6, (18)-6', (18)-7, (18)-8, (18)-9, (18)-
10, (18)-10', (18)-10'', or (18)-11 below.

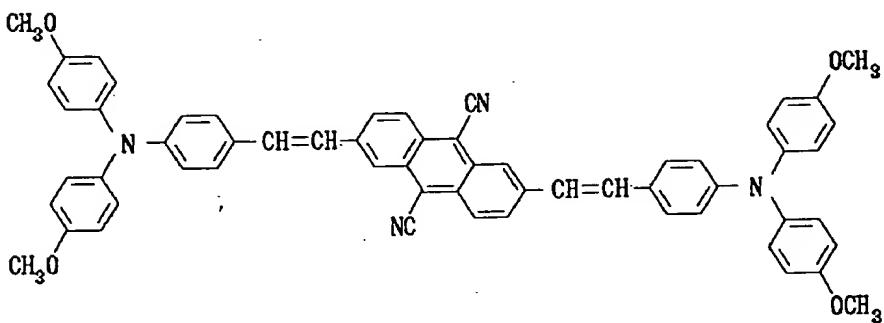
Structural formula (18)-1



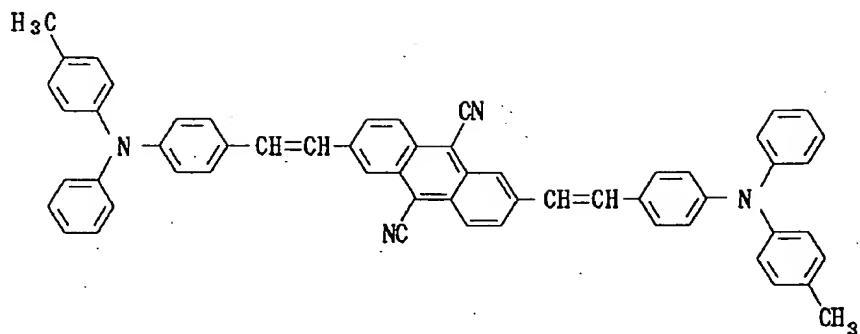
Structural formula (18)-2



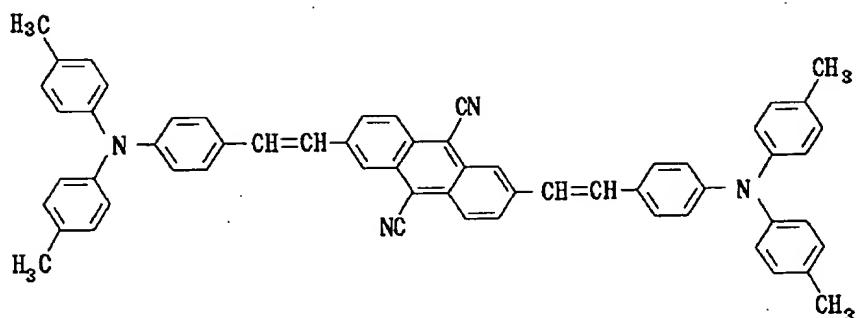
Structural formula (18)-2'



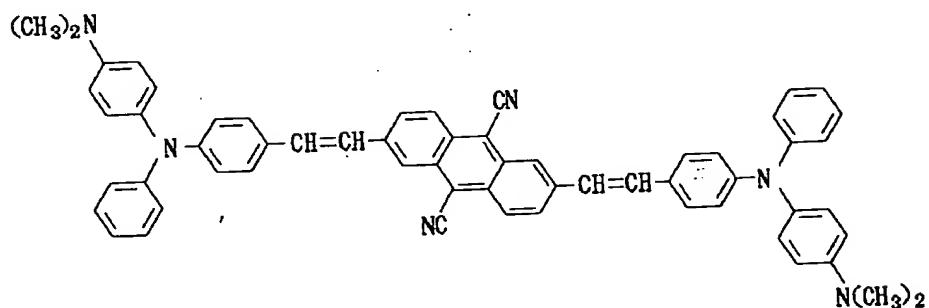
Structural formula (18) - 3



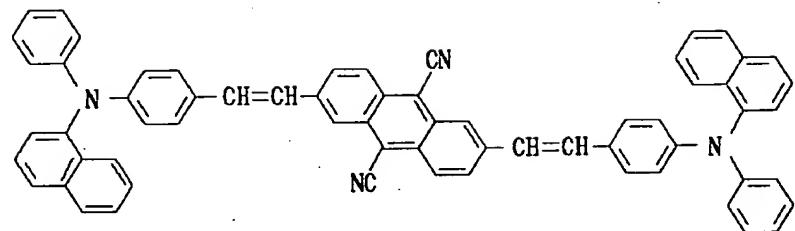
Structural formula (18) - 4



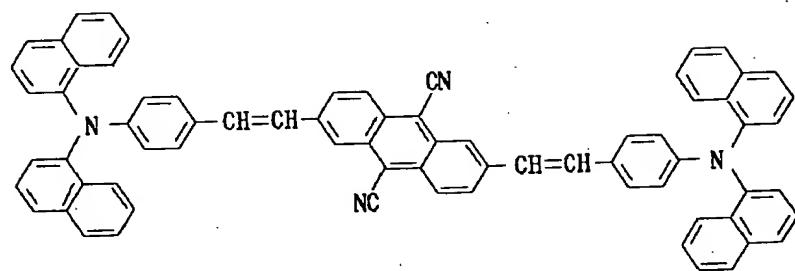
Structural formula (18) - 5



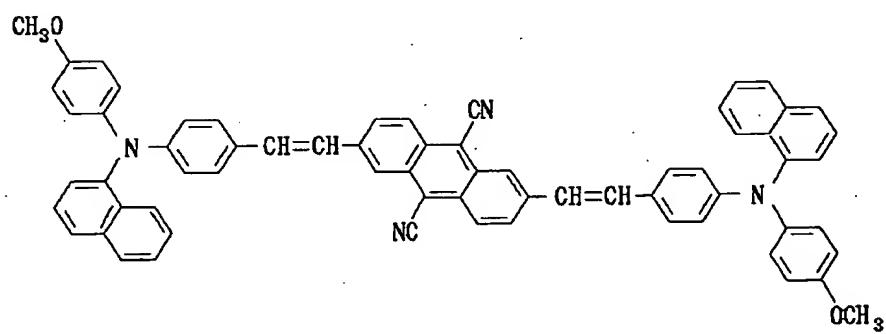
Structural formula (18) - 6



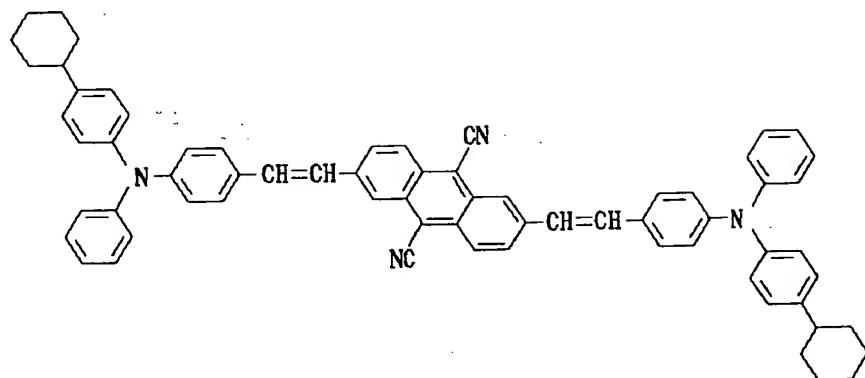
Structural formula (18) - 6'



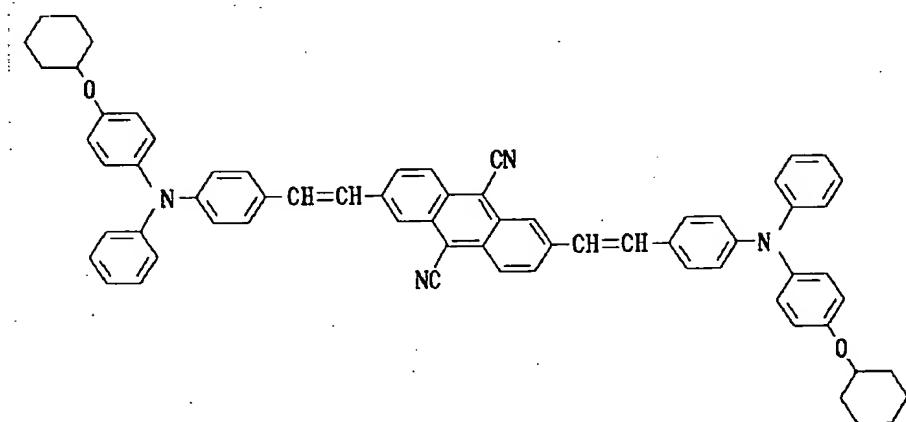
Structural formula (18) - 7



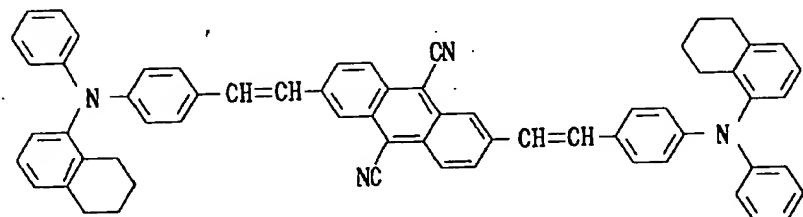
Structural formula (18) - 8



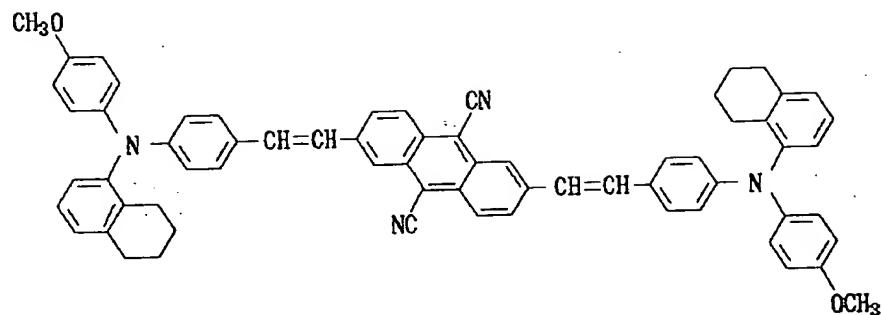
Structural formula (18) - 9



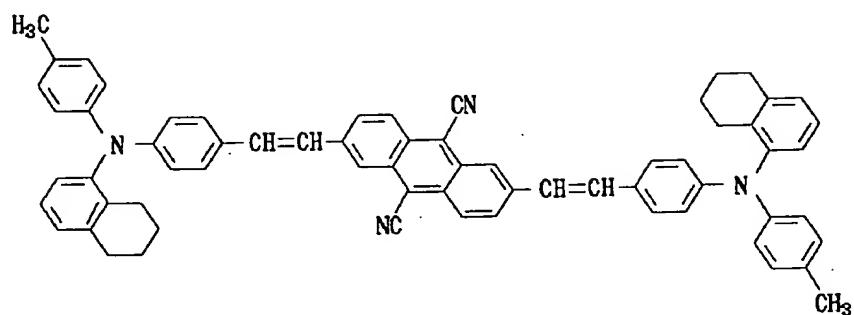
Structural formula (18) - 10



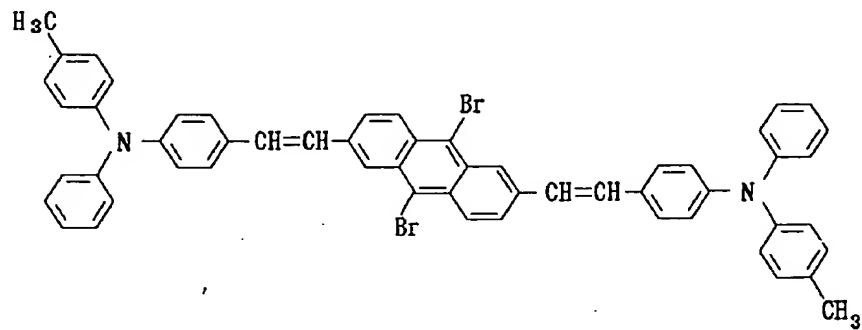
Structural formula (18)-10'



Structural formula (18)-10"



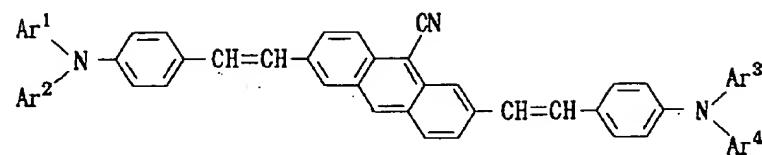
Structural formula (18)-11



6. A bis(aminostyryl)anthracene compound

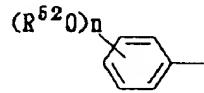
represented by the general formula (19) below.

General formula (19)

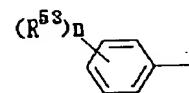


(where Ar¹, Ar², Ar³, and Ar⁴ are identical or different, each denoting an aryl group which may have a substituent, and if a substituent is present, said aryl group being one which is selected from aryl groups represented by the general formula (7), (8), (9), (10), (11), (12), (12'), or (12'') below.

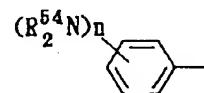
General formula (7)



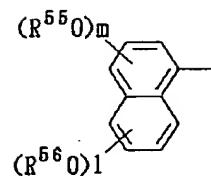
General formula (8)



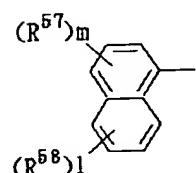
General formula (9)



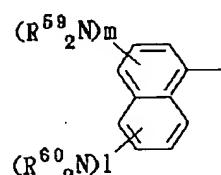
General formula (10)



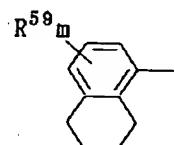
General formula (11)



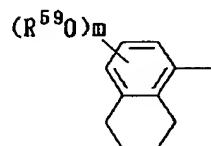
General formula (12)



General formula (12')



General formula (12'')



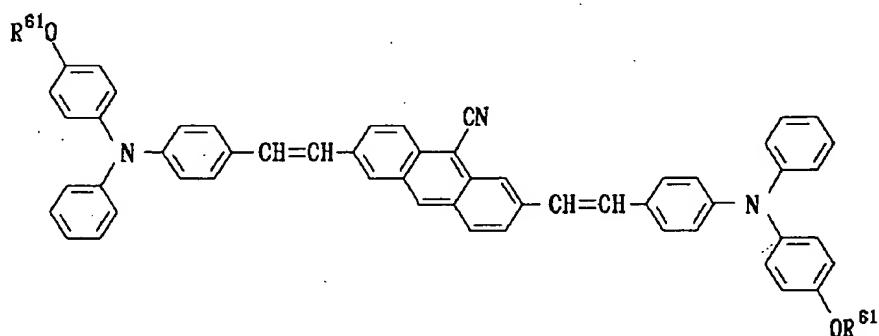
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U.S. PATENT OFFICE
JULY 22 1970

(where R^{52} , R^{53} , and R^{54} each denotes a saturated or unsaturated hydrocarbon group having one or more carbons; R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} are identical or different, each denoting a saturated or unsaturated hydrocarbon group having one or more carbons; n is an integer of 0 to 6; m is an integer of 0 to 3; and l is an integer of 0 to 4.)

7. A bis(aminostyryl)anthracene compound as defined in Claim 6, wherein R^{52} , R^{53} , R^{54} , R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} each has 1 to 6 carbon atoms.

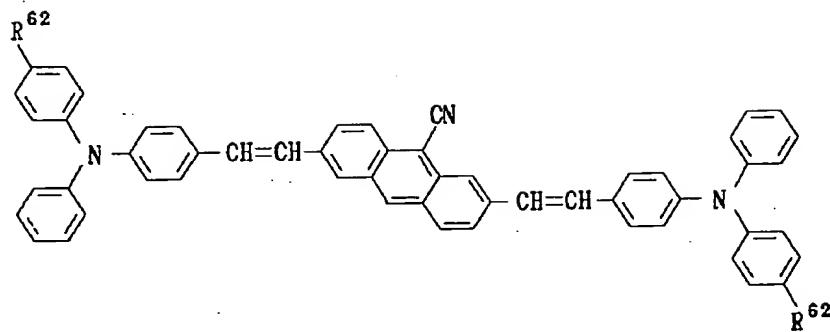
8. A bis(aminostyryl)anthracene compound as defined in Claim 1 or 6 which is represented by the general formula (20), (21), (22), (23), (24), (24') or (24'') below.

General formula (20)



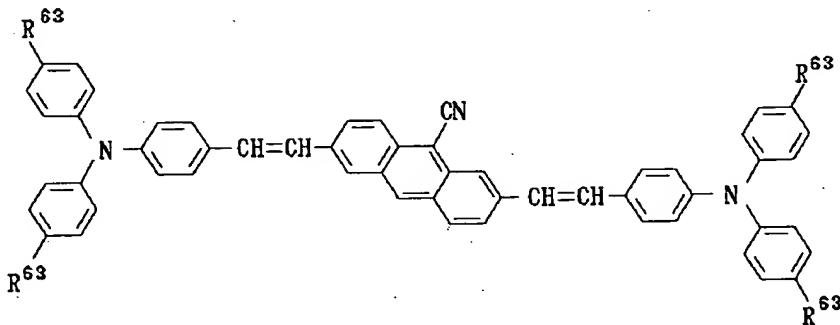
(where R^{61} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (21)



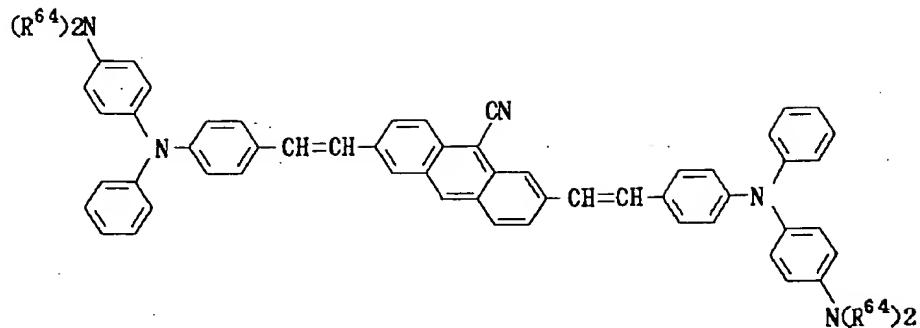
(where R⁶² denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (22)



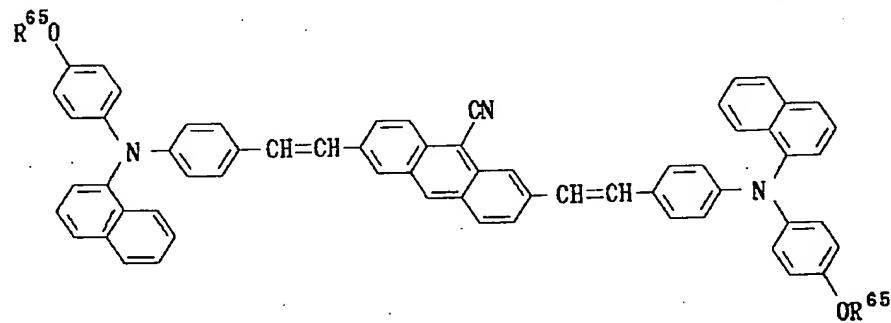
(where R⁶³ denotes a saturated or unsaturated hydrocarbon group or hydrocarbon oxy group having 1 to 6 carbon atoms.)

General formula (23)



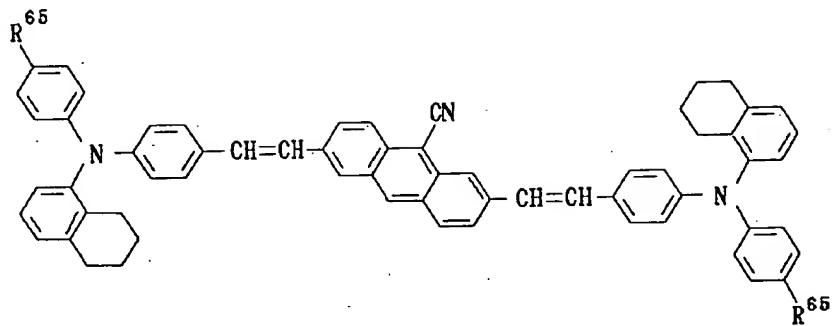
(where R⁶⁴ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (24)



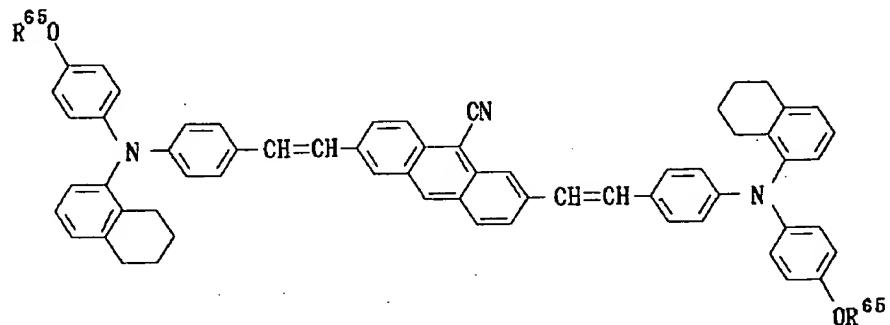
(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (24')



(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (24")

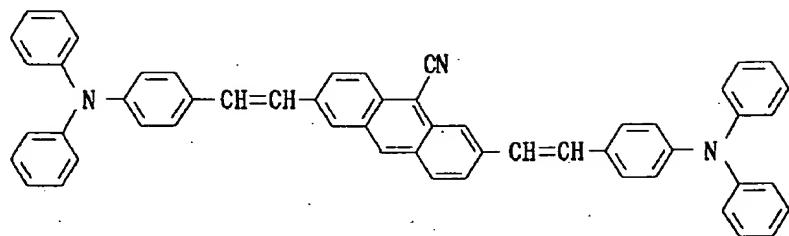


(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

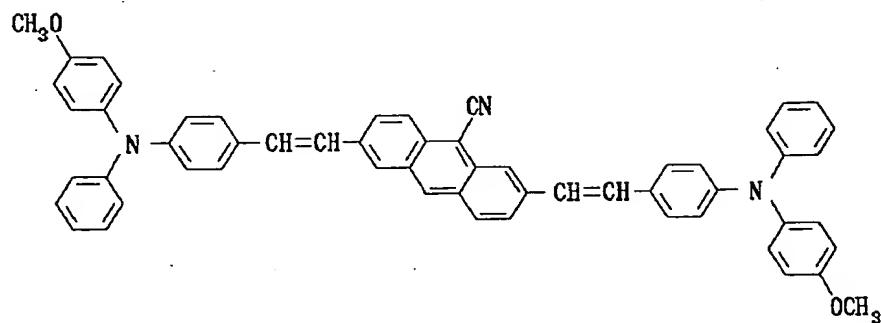
9. A bis(aminostyryl)anthracene compound as defined in Claim 1 or 6 which is represented by the structural formula (25)-1, (25)-2, (25)-2', (25)-3, (25)-4, (25)-5, (25)-6, (25)-6', (25)-7, (25)-8, (25)-9, (25)-

10, (25)-10', (25)-10'', or (25)-11 below.

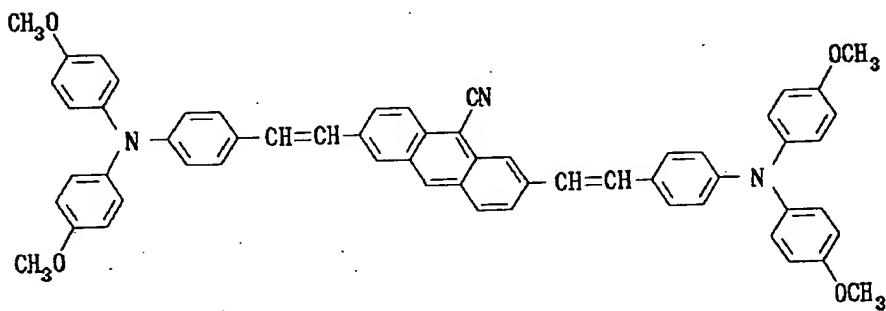
Structural formula (25)-1



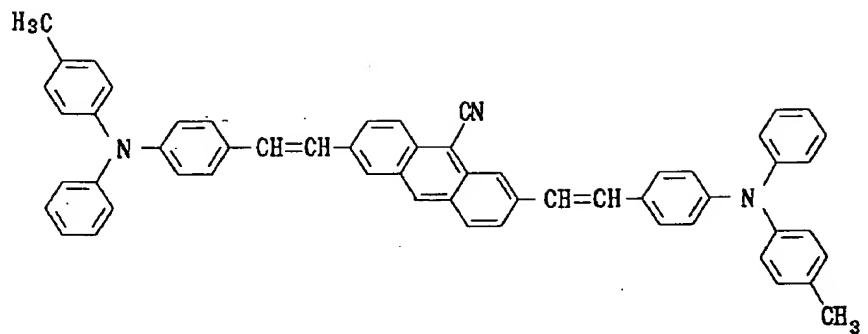
Structural formula (25)-2



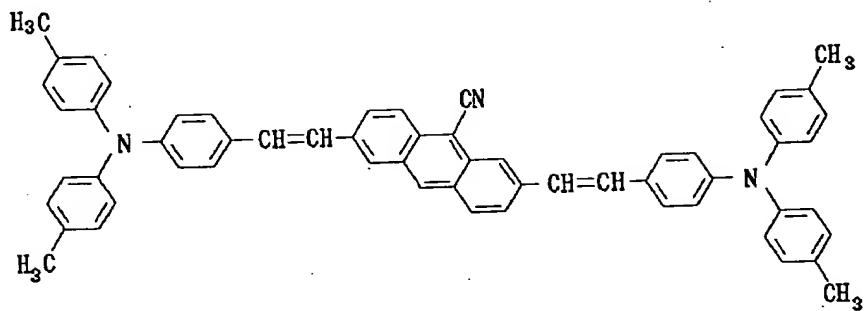
Structural formula (25)-2'



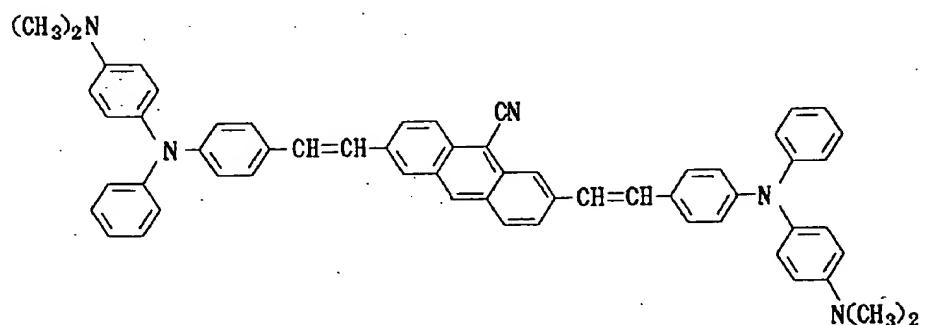
Structural formula (25) - 3



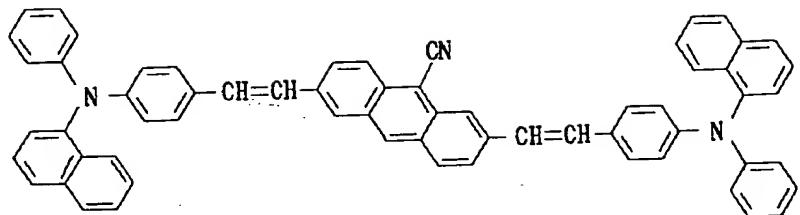
Structural formula (25) - 4



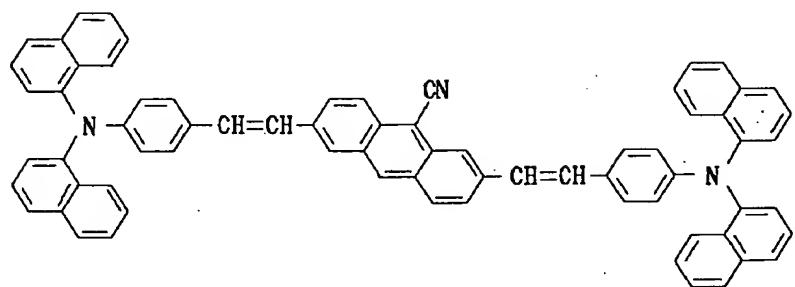
Structural formula (25) - 5



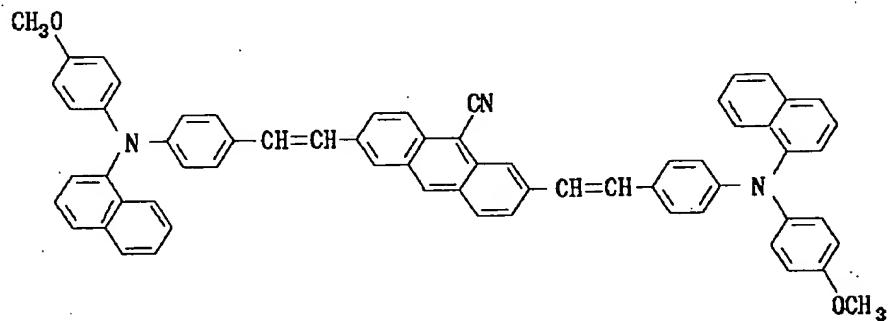
Structural formula (25) - 6



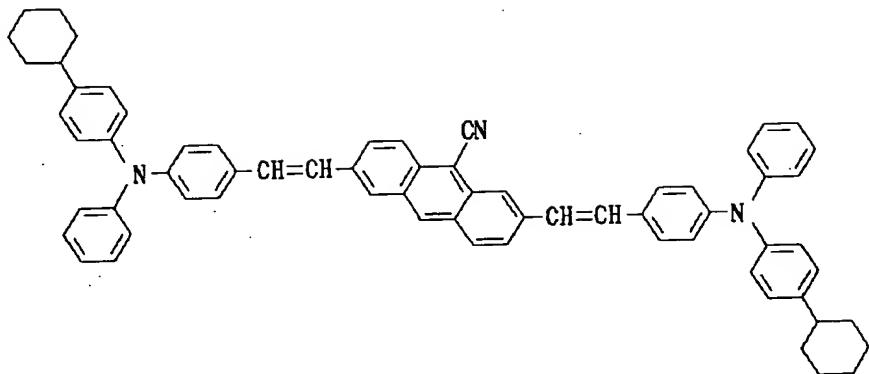
Structural formula (25) - 6'



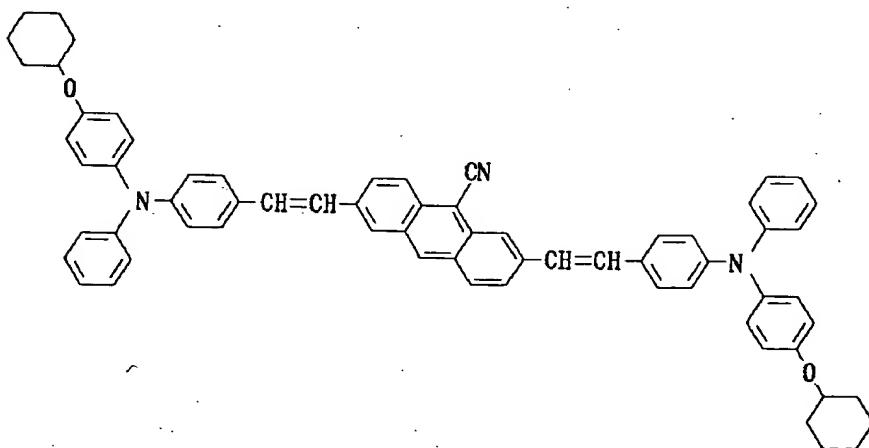
Structural formula (25) - 7



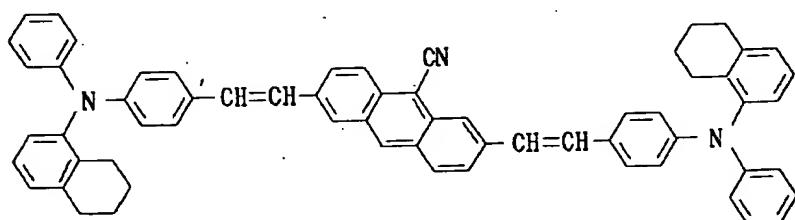
Structural formula (25) - 8



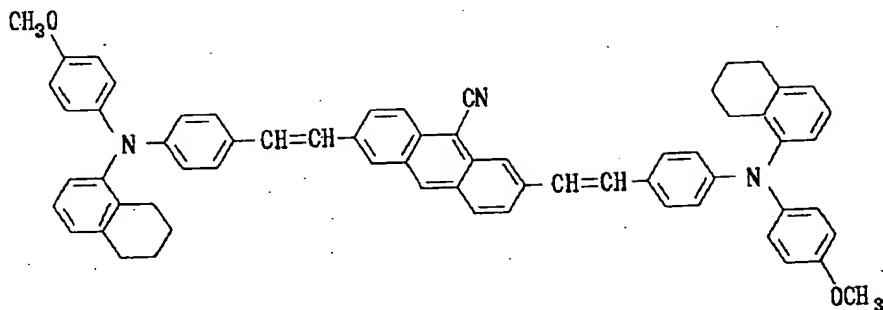
Structural formula (25) - 9



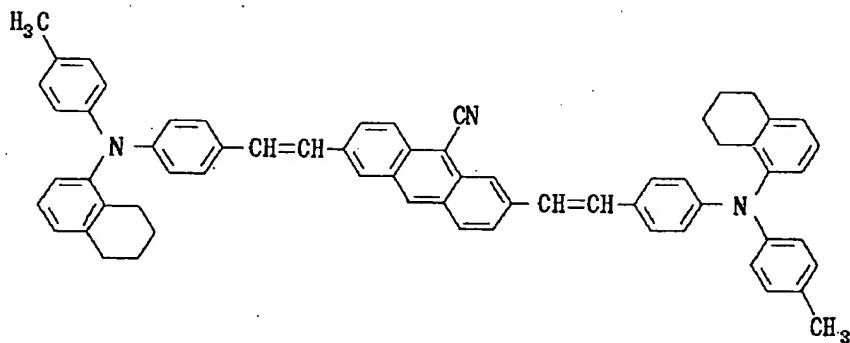
Structural formula (25) - 10



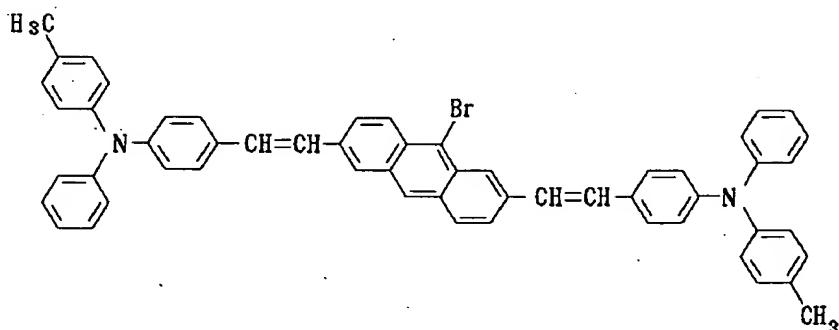
Structural formula (25)-10'



Structural formula (25)-10"

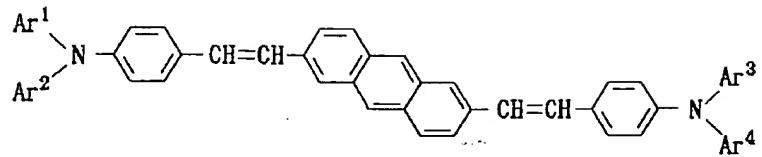


Structural formula (25)-11



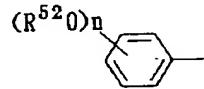
10. A bis(aminostyryl)anthracene compound which is represented by the general formula (26) below.

General formula (26)

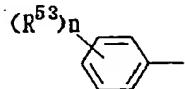


(where Ar¹, Ar², Ar³, and Ar⁴ are identical or different, each denoting an aryl group which may have a substituent, and if a substituent is present, said aryl group being one which is selected from aryl groups represented by the general formula (7), (8), (9), (10), (11), (12), (12'), or (12'') below.

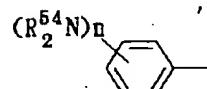
General formula (7)



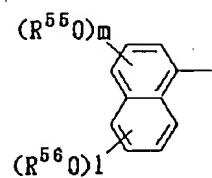
General formula (8)



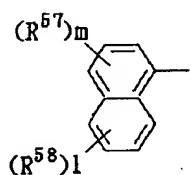
General formula (9)



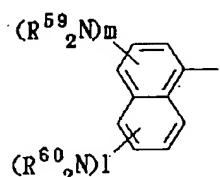
General formula (10)



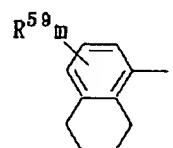
General formula (11)



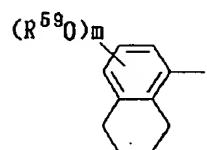
General formula (12)



General formula (12')



General formula (12'')

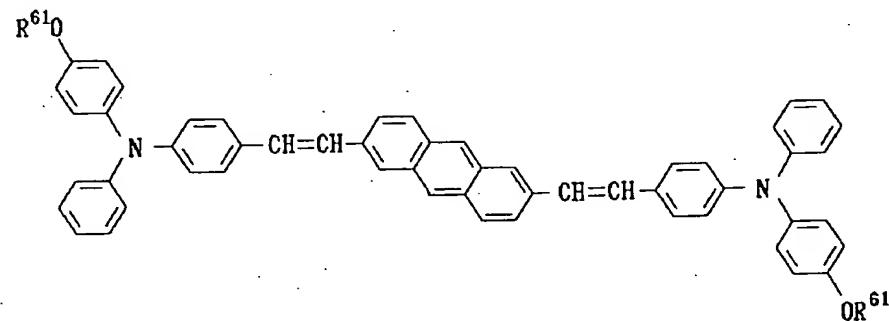


(where R^{52} , R^{53} , and R^{54} each denotes a saturated or unsaturated hydrocarbon group having one or more carbons; R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} are identical or different, each denoting a saturated or unsaturated hydrocarbon group having one or more carbons; n is an integer of 0 to 6; m is an integer of 0 to 3; and l is an integer of 0 to 4.)

11. A bis(aminostyryl)anthracene compound as defined in Claim 10, wherein R^{52} , R^{53} , R^{54} , R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} each has 1 to 6 carbon atoms.

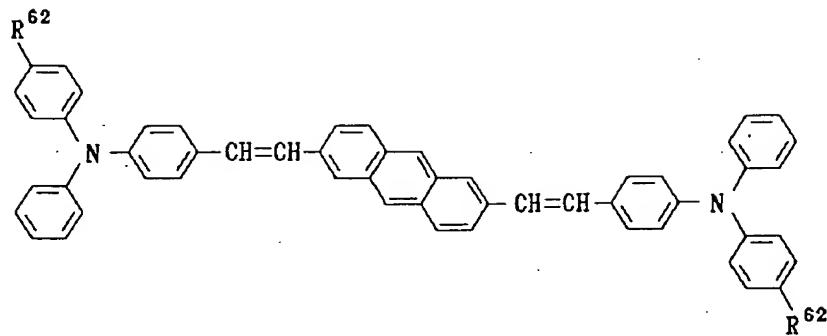
12. A bis(aminostyryl)anthracene compound as defined in Claim 1 or 10 which is represented by the general formula (27), (28), (29), (30), (31), (31') or (31'') below.

General formula (27)



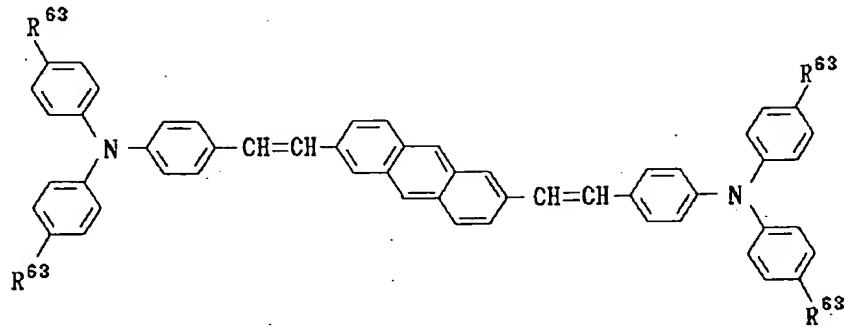
(where R^{61} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (28)



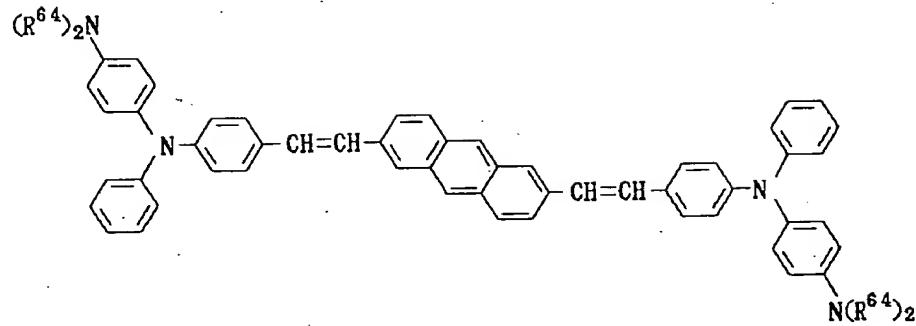
(where R⁶² denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (29)



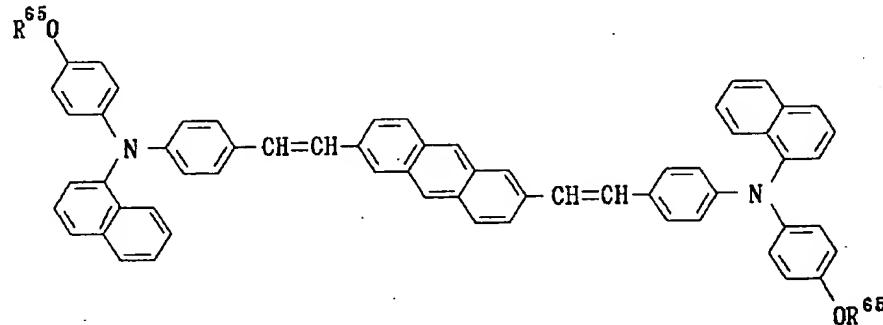
(where R⁶³ denotes a saturated or unsaturated hydrocarbon group or hydrocarbon oxy group having 1 to 6 carbon atoms.)

General formula (30)



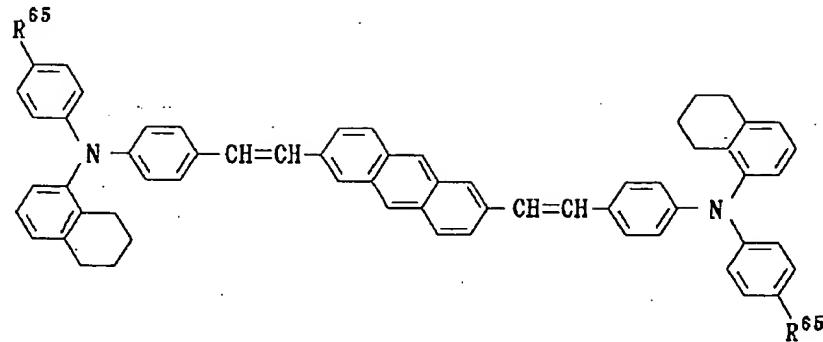
(where R^{64} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (31)



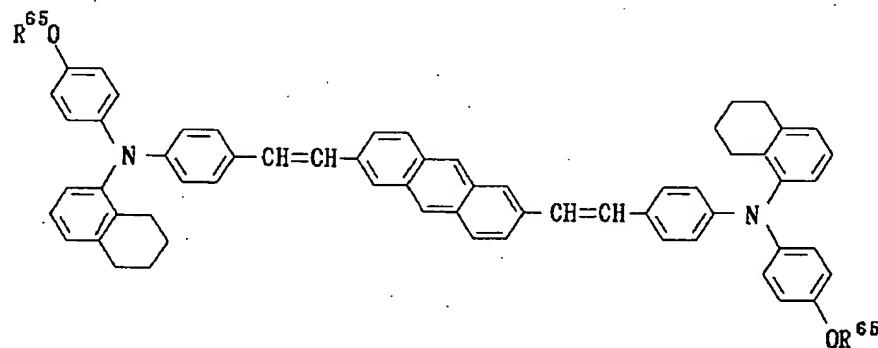
group having 1 to 6 carbon atoms.)

General formula (31')



(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (31")

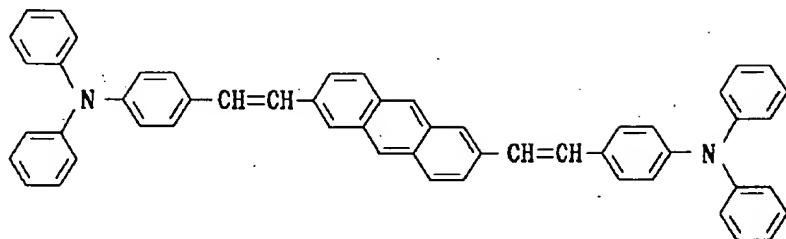


(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

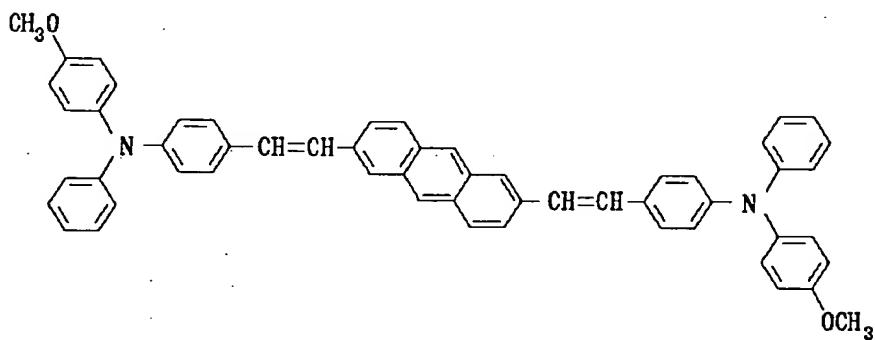
13. A bis(aminostyryl)anthracene compound as defined in Claim 1 or 10 which is represented by the structural formula (32)-1, (32)-2, (32)-2', (32)-3, (32)-4, (32)-5, (32)-6, (32)-6', (32)-7, (32)-8, (32)-9, (32)-

10, (32)-10', or (32)-10" below.

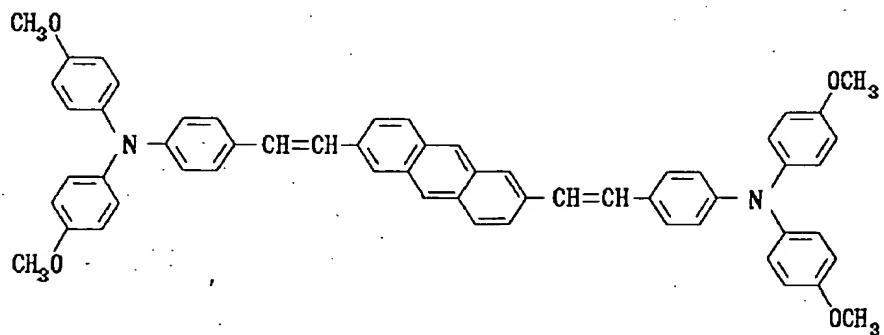
Structural formula (32)-1



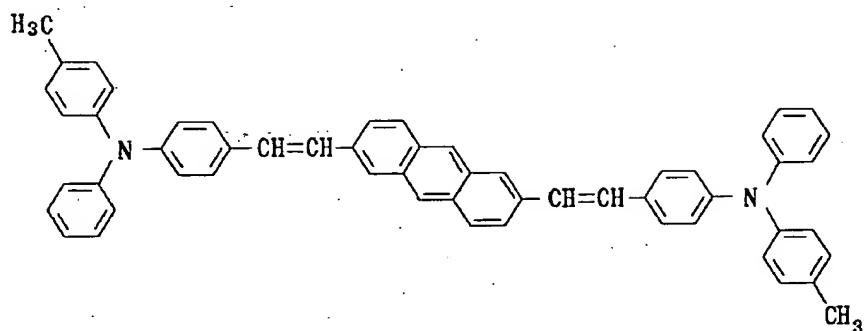
Structural formula (32)-2



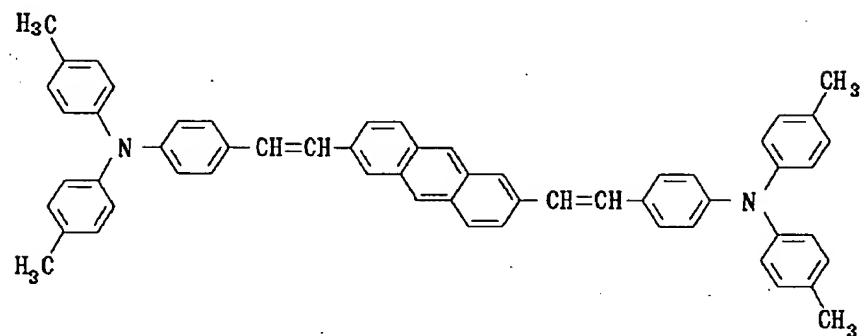
Structural formula (32)-2'



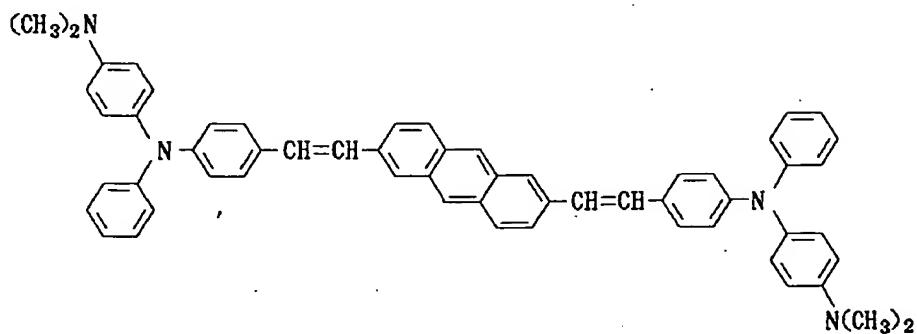
Structural formula (32) - 3



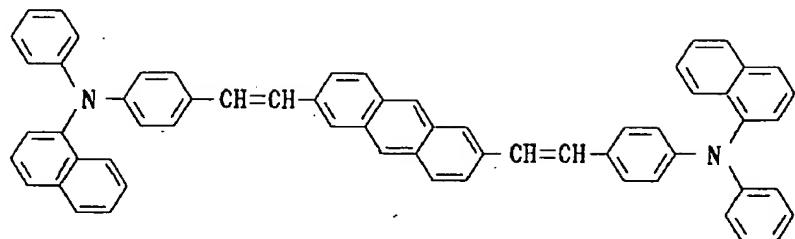
Structural formula (32) - 4



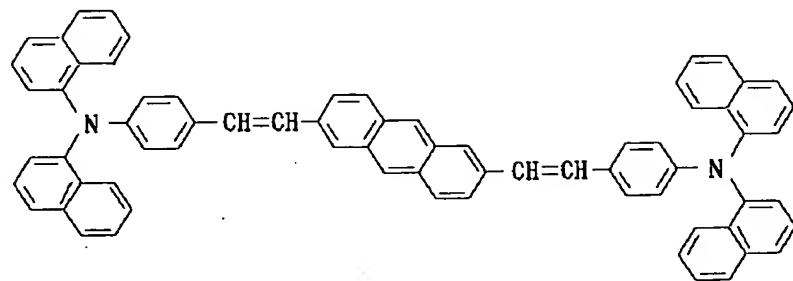
Structural formula (32) - 5



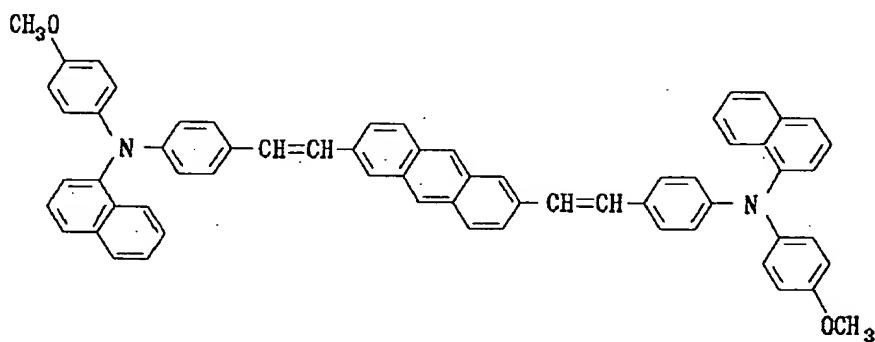
Structural formula (32) - 6



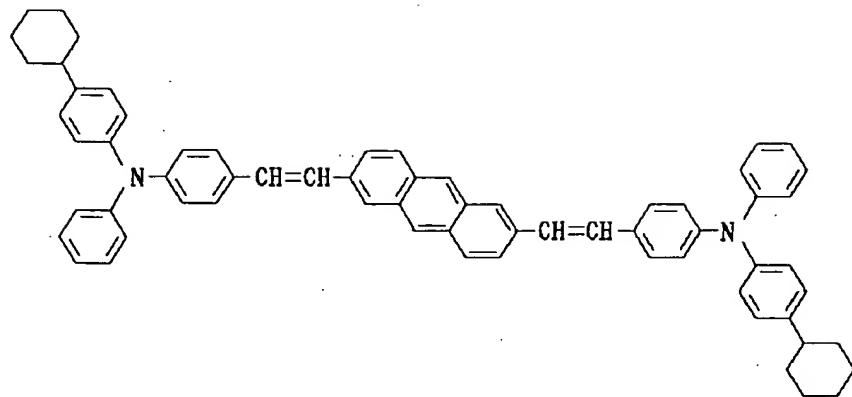
Structural formula (32) - 6'



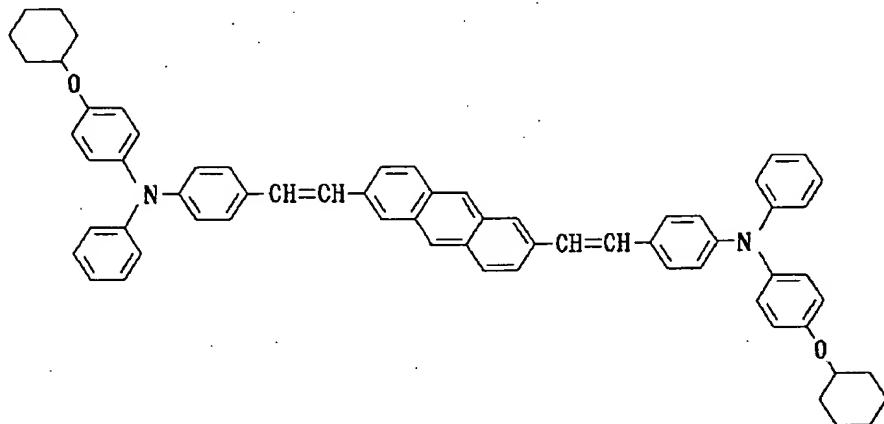
Structural formula (32) - 7



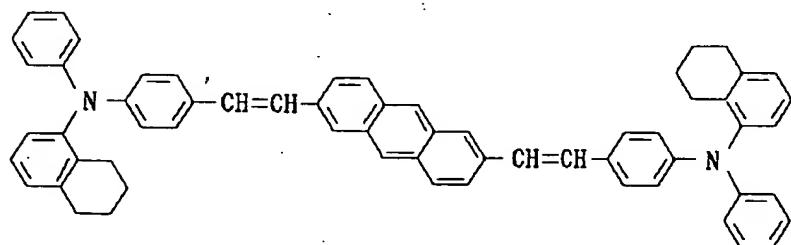
Structural formula (32) - 8



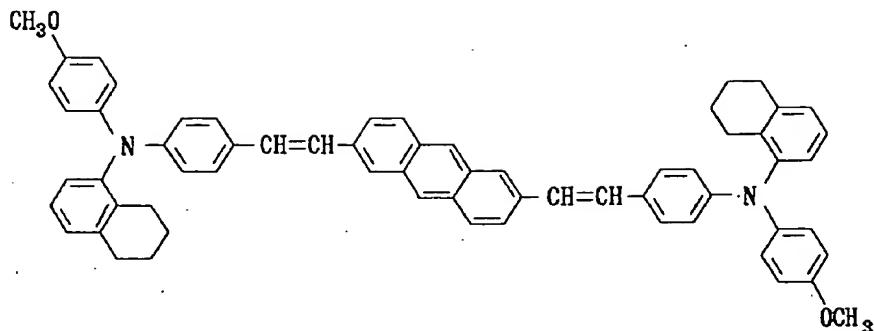
Structural formula (32) - 9



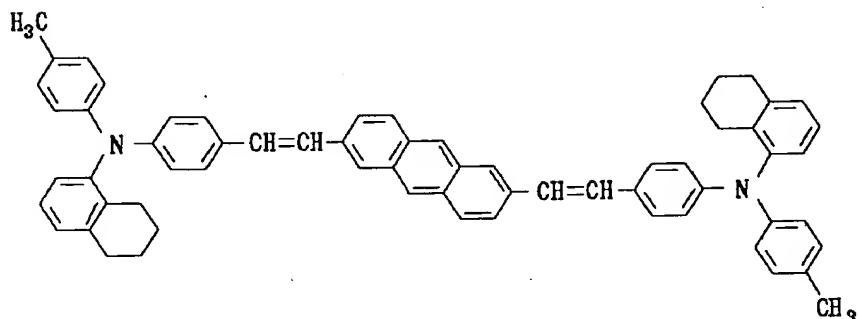
Structural formula (32) - 10



Structural formula (35)-10'



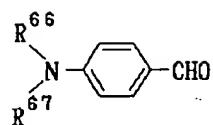
Structural formula (32)-10"



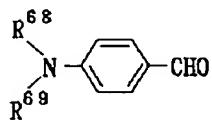
14. A process for producing a bis(aminostyryl)anthracene compound represented by the general formula [I], [II], [III], or [IV] below, said process comprising condensing at least one species of 4-(N,N-diarylmino)benzaldehyde represented by the general formula [V] or [VI] below and diphosphonic ester represented by the general formula [VII] below or diphosphonium represented by the general formula [VIII]

below.

General formula [V]

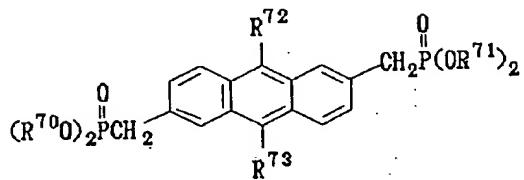


General formula [VI]

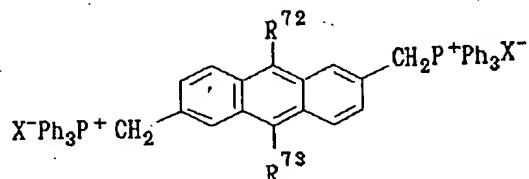


(where R⁶⁶ and R⁶⁷ each denotes an aryl group corresponding to R¹, R², R¹², R¹³, R²³, R²⁴, R³⁴, or R³⁵ given below; and R⁶⁸ and R⁶⁹ each denotes an aryl group corresponding to R³, R⁴, R¹⁴, R¹⁵, R²⁵, R²⁶, R³⁶, or R³⁷ given below.)

General formula [VII]



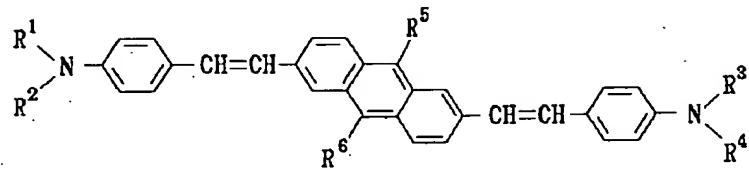
General formula [VIII]



(where R⁷⁰ and R⁷¹ are identical or different, each

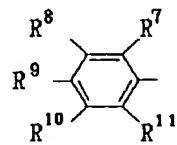
denoting a hydrocarbon group; R⁷² and R⁷³ each denotes a group corresponding to R⁵, R⁶, R¹⁶, R¹⁷, R²⁷, R²⁸, R³⁸, or R³⁹ given below; and X denotes a halogen atom.)

General formula [I]



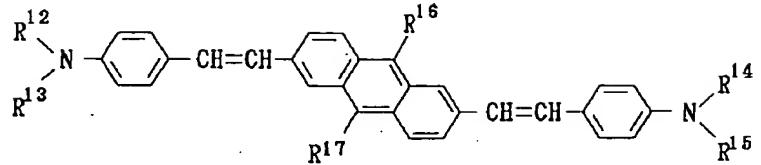
(where R² and R³ each denotes an unsubstituted aryl group, and R¹ and R⁴ each denotes an aryl group represented by the general formula (1) below.)

General formula (1)



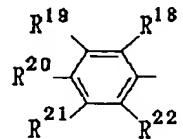
(where R⁷, R⁸, R⁹, R¹⁰, and R¹¹ are identical or different groups, at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group having one or more carbons; and R⁵ and R⁶ are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [II]



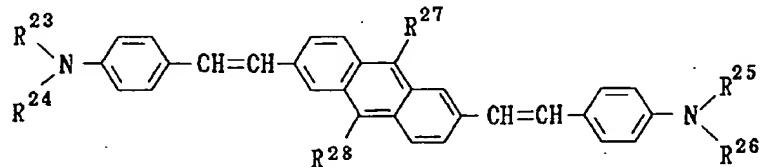
(where R^{12} , R^{13} , R^{14} , and R^{15} are identical or different groups, each denoting an aryl group represented by the general formula (2) below.)

General formula (2)



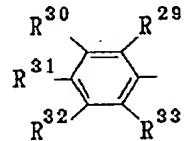
(where R^{18} , R^{19} , R^{20} , R^{21} , and R^{22} are identical or different groups, at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group having one or more carbons; and R^{16} and R^{17} are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [III]



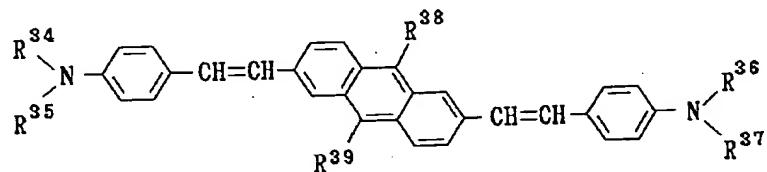
(where at least one of R²³, R²⁴, R²⁵, and R²⁶ denotes an aryl group represented by the general formula (3) below, with the remainder being an unsubstituted aryl group.)

General formula (3)



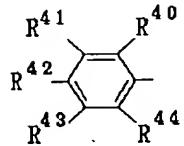
(where R²⁹, R³⁰, R³¹, R³², and R³³ are identical or different groups, at least one of them being a saturated or unsaturated hydrocarbon amino group; and R²⁷ and R²⁸ are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [IV]



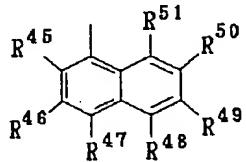
(where R³⁵ and R³⁶ are identical or different groups, each denoting an aryl group represented by the general formula (4) below.)

General formula (4)



(where R⁴⁰, R⁴¹, R⁴², R⁴³, and R⁴⁴ are identical or different groups, each denoting hydrogen or at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group having one or more carbons; and R³⁴ and R³⁷ are identical or different groups, being an aryl group represented by the general formula (5) below.)

General formula (5)

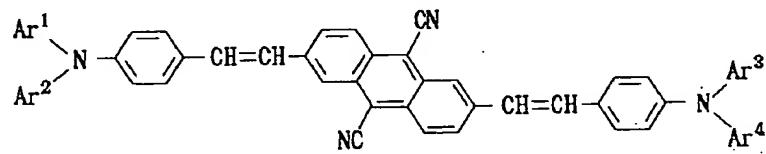


(where R⁴⁵, R⁴⁶, R⁴⁷, R⁴⁸, R⁴⁹, R⁵⁰, and R⁵¹ are identical or different groups, each denoting a hydrogen atom or at least one of them being a saturated or unsaturated hydrocarbon oxy group or hydrocarbon group, or hydrocarbon amino group having one or more carbons; and R³⁸ and R³⁹ are identical or different groups, at least one of them being a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

15. A process for producing a bis(aminostyryl) anthracene compound as defined in Claim 14, wherein said condensation is accomplished by Wittig-Horner reaction or Wittig reaction, which involves treating the diphosphonic ester and/or diphosphonium with a base in a solvent, thereby giving carboanion, and condensing this carboanion with the 4-(N,N-diaryl amino)benzaldehyde.

16. A process for producing a bis(aminostyryl) anthracene compound as defined in Claim 14, wherein said bis(aminostyryl) anthracene is represented by the general formula (6) below.

General formula (6)

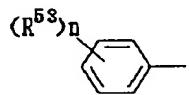


(where Ar¹, Ar², Ar³, and Ar⁴ are identical or different, each denoting an aryl group which may have a substituent, and if a substituent is present, said aryl group being one which is selected from aryl groups represented by the general formula (7), (8), (9), (10), (11), (12), (12'), or (12'') below.

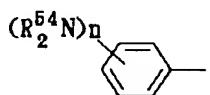
General formula (7)



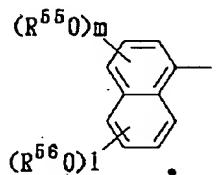
General formula (8)



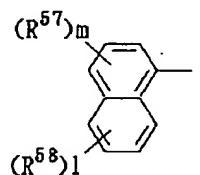
General formula (9)



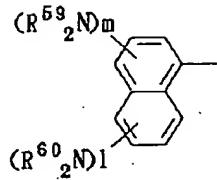
General formula (10)



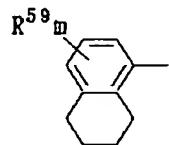
General formula (11)



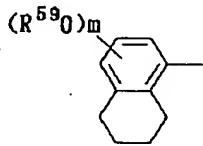
General formula (12)



General formula (12')



General formula (12'')

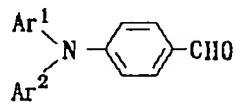


(where R^{52} , R^{53} , and R^{54} each denotes a saturated or unsaturated hydrocarbon group having one or more carbons; R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} are identical or different, each denoting a saturated or unsaturated hydrocarbon group having one or more carbons; n is an integer of 0 to 6; m is an integer of 0 to 3; and l is an integer of 0 to 4.)

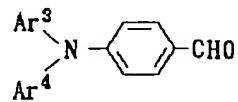
said process comprising condensing at least one species of 4-(*N,N*-diarylamino)benzaldehyde represented by the

general formula (33) or (34) below with diphosphonic ester represented by the general formula (35) below or diphosphonium represented by the general formula (36) below.

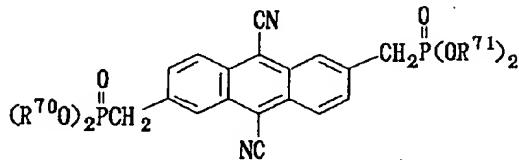
General formula (33)



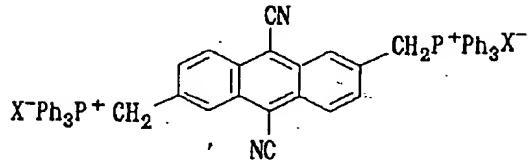
General formula (34)



General formula (35)



General formula (36)



(where Ar^1 , Ar^2 , Ar^3 , Ar^4 , R^{70} , R^{71} and X are defined as above.)

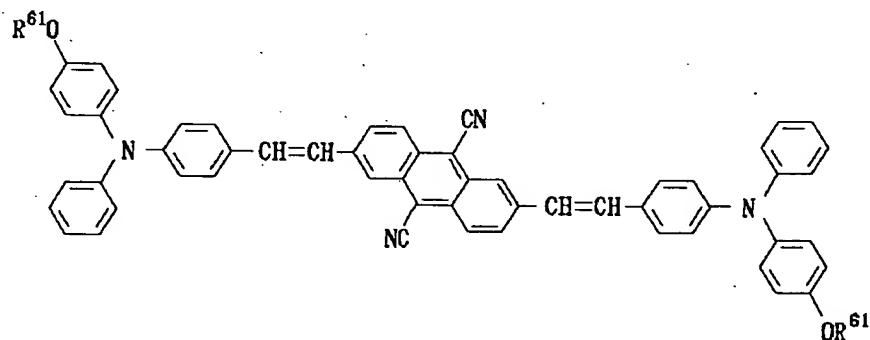
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17. A process for producing a bis(aminostyryl) anthracene compound as defined in Claim 16, wherein R⁷⁰ and R⁷¹ each denotes a saturated hydrocarbon group having 1 to 4 carbon atoms.

18. A process for producing a bis(aminostyryl) anthracene compound as defined in Claim 16, wherein R⁵², R⁵³, R⁵⁴, R⁵⁵, R⁵⁶, R⁵⁷, R⁵⁸, R⁵⁹, and R⁶⁰ each has 0 to 6 carbon atoms.

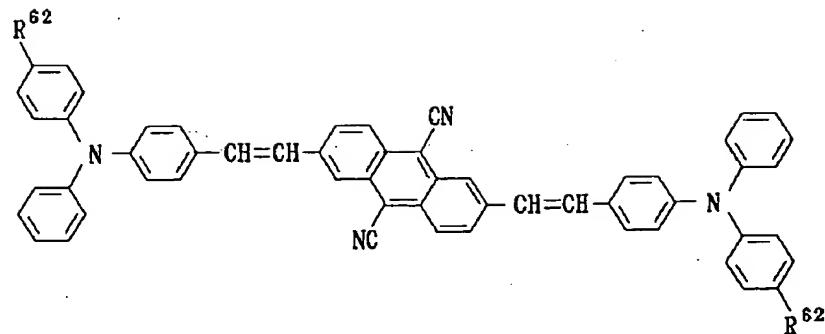
19. A process for producing a bis(aminostyryl) anthracene compound as defined in Claim 14 or 16, wherein said process yields a bis(aminostyryl)anthracene compound represented by the general formula (13), (14), (15), (16), (17), (17'), or (17") below.

General formula (13)



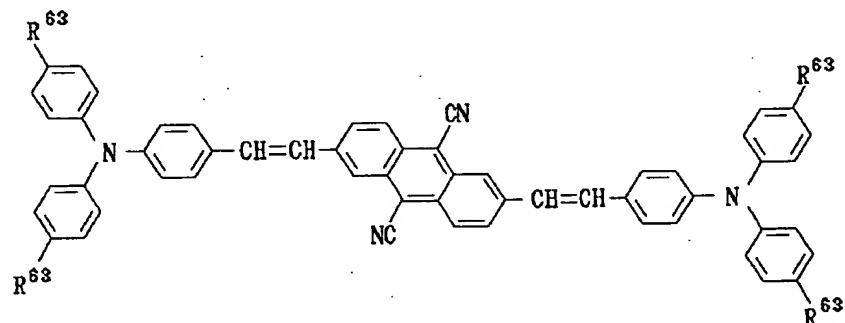
(where R⁶¹ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (14)



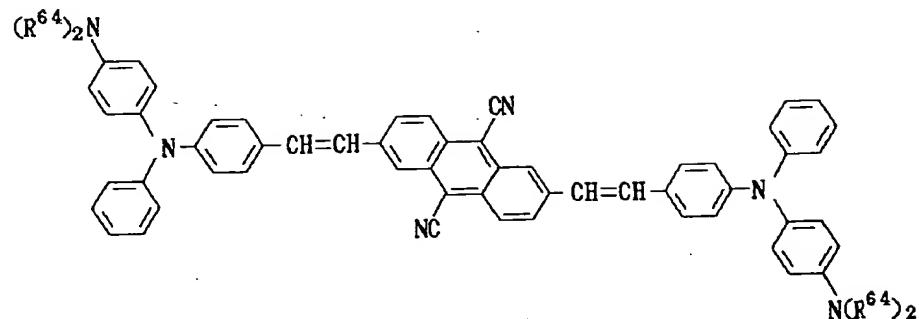
(where R⁶² denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (15)



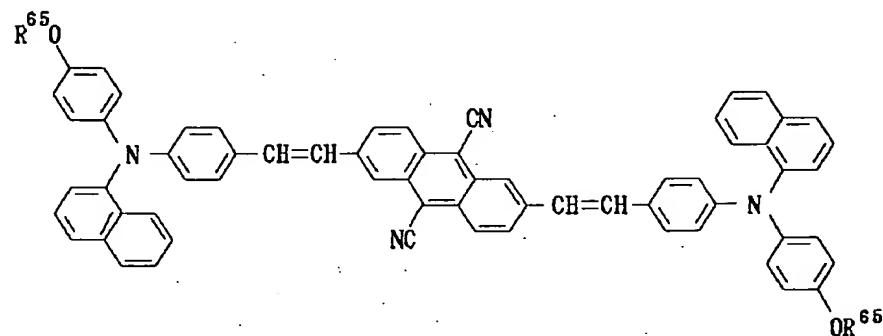
(where R⁶³ denotes a saturated or unsaturated hydrocarbon group or hydrocarbon oxy group having 1 to 6 carbon atoms.)

General formula (16)



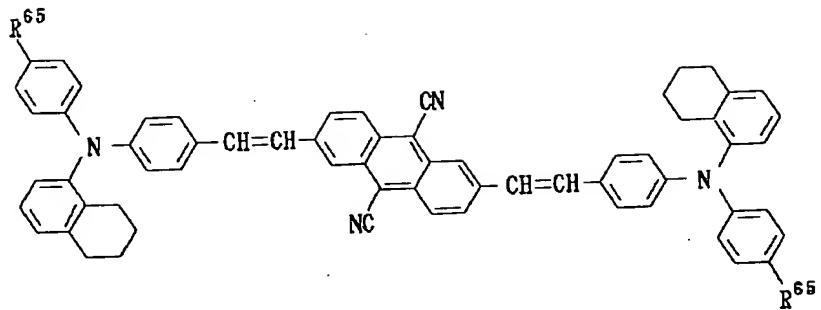
(where R^{64} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (17)



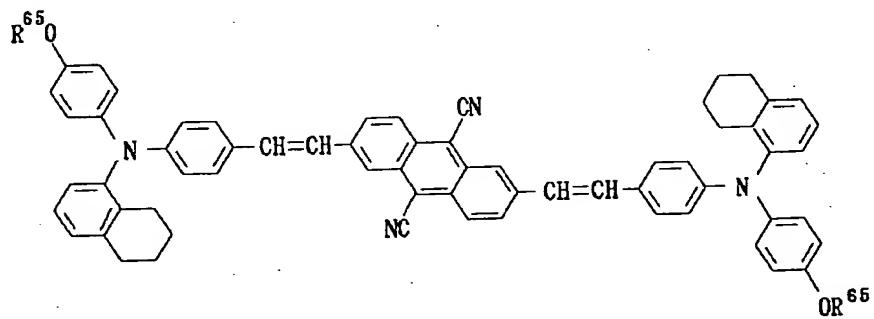
(where R^{65} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (17')



(where R⁶⁵ denotes a hydrogen atom or a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (17")

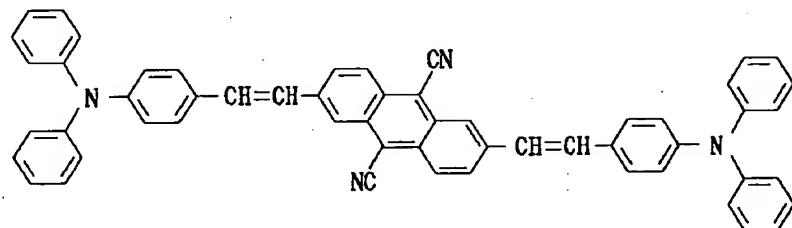


(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

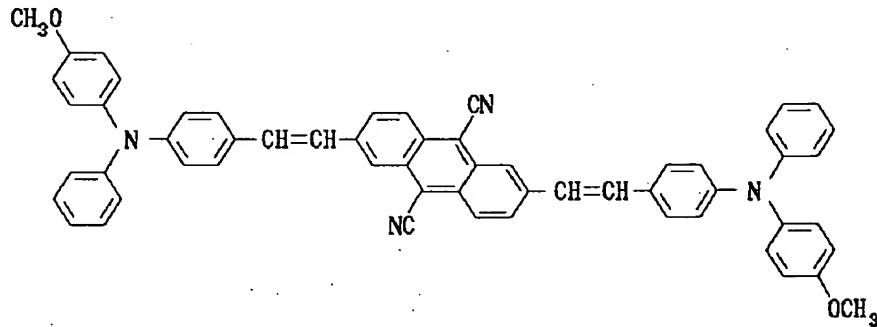
20. A process for producing a bis(aminostyryl) anthracene compound as defined in Claim 14, or 16, wherein said process yields a bis(aminostyryl) anthracene compound

represented by the structural formula (18)-1, (18)-2,
(18)-2', (18)-3, (18)-4, (18)-5, (18)-6, (18)-6', (18)-7,
(18)-8, (18)-9, (18)-10, (18)-10', (18)-10'', or (18)-11
below.

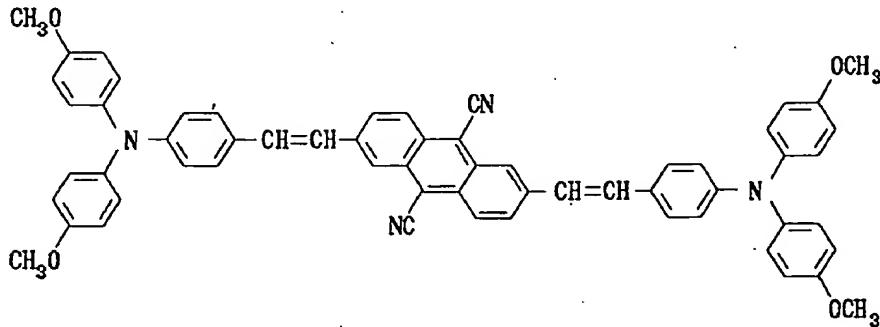
Structural formula (18)-1



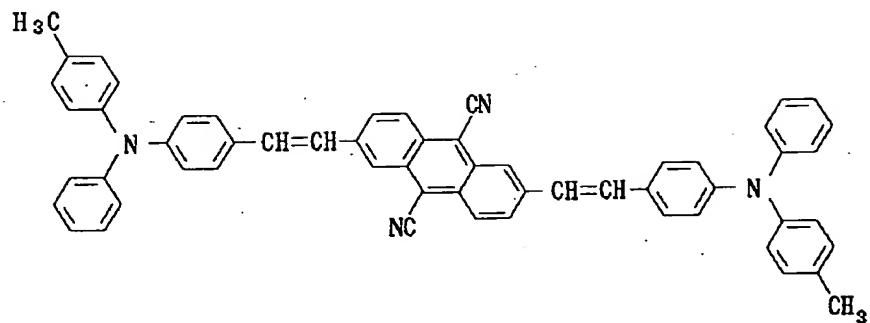
Structural formula (18)-2



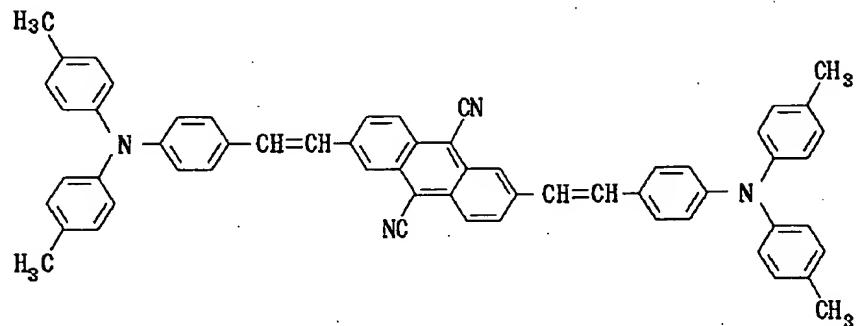
Structural formula (18)-2'



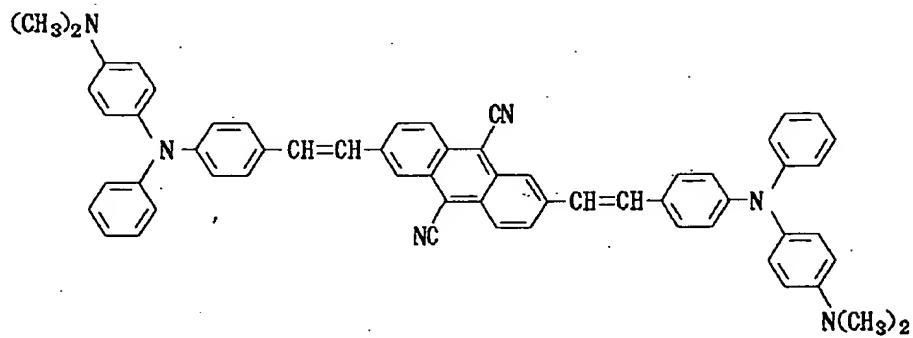
Structural formula (18) - 3



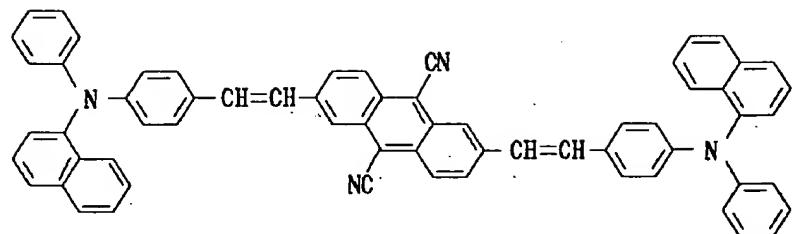
Structural formula (18) - 4



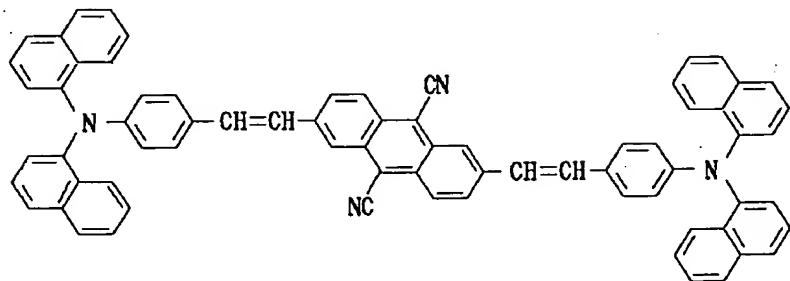
Structural formula (18) - 5



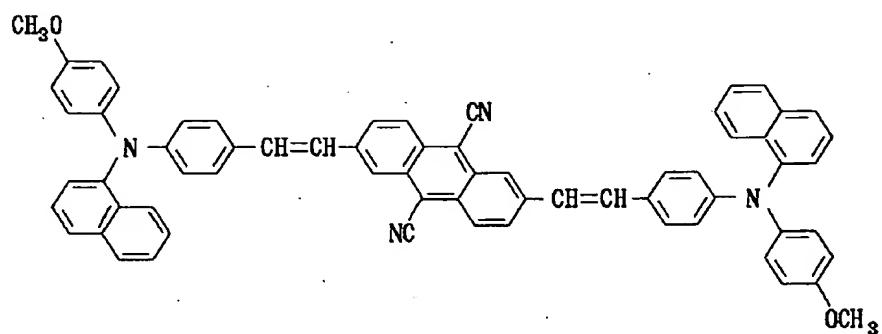
Structural formula (18) - 6



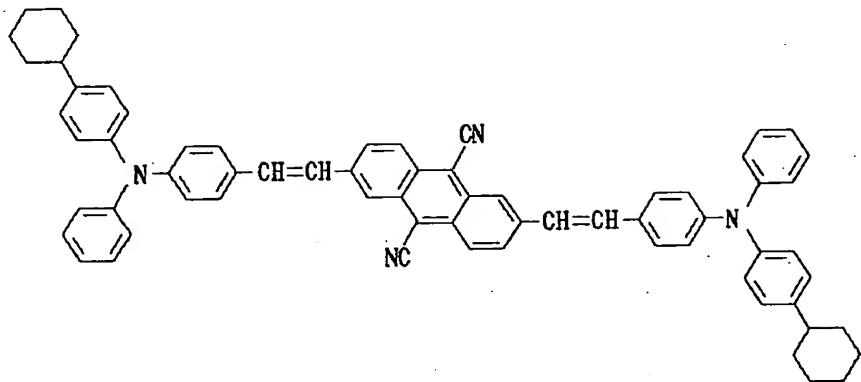
Structural formula (18) - 6'



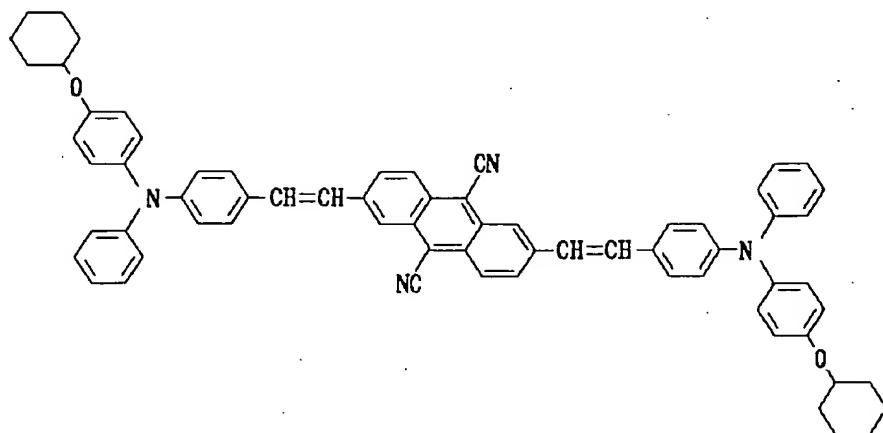
Structural formula (18) - 7



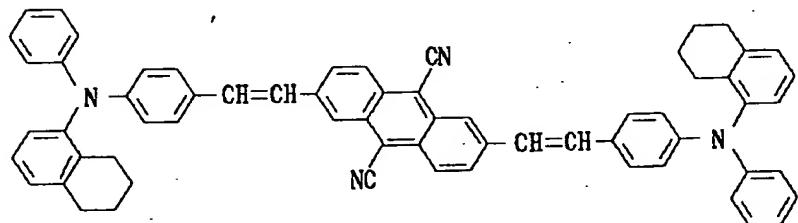
Structural formula (18) - 8



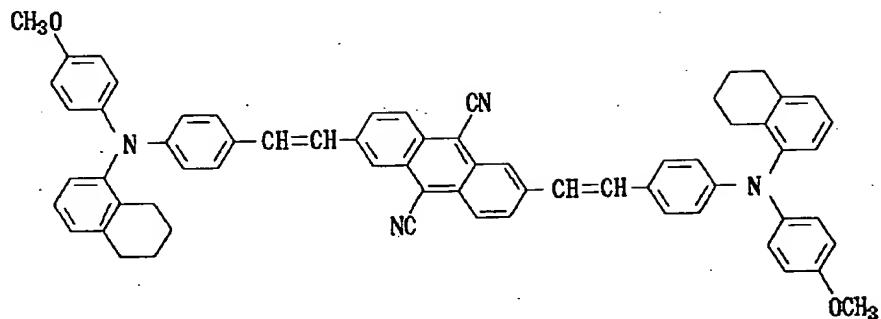
Structural formula (18) - 9



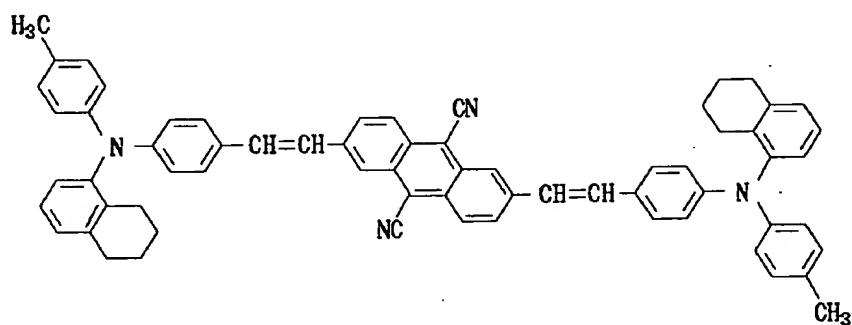
Structural formula (18)-10



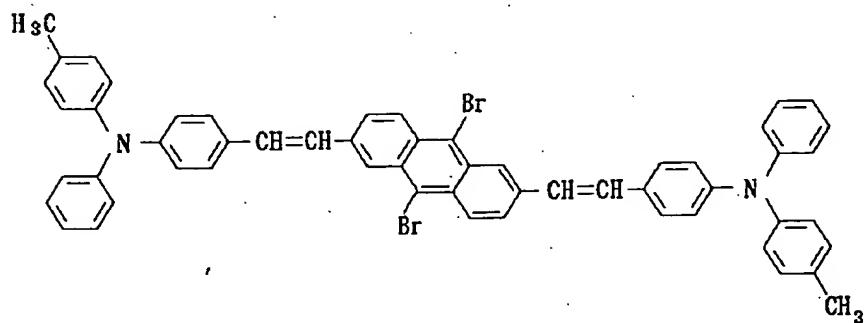
Structural formula (18)-10'



Structural formula (18)-10"



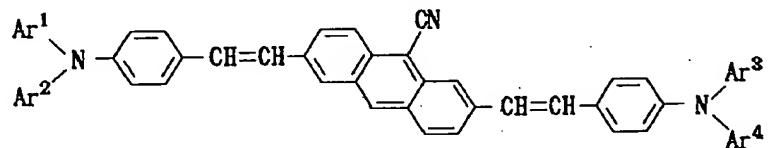
Structural formula (18)-11



21. A process for producing a

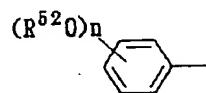
bis(aminostyryl)anthracene compound as defined in Claim 14, wherein said bis(aminostyryl)anthracene is represented by the general formula (19) below.

General formula (19)

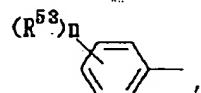


(where Ar¹, Ar², Ar³, and Ar⁴ are identical or different, each denoting an aryl group which may have a substituent, and if a substituent is present, said aryl group being one which is selected from aryl groups represented by the general formula (7), (8), (9), (10), (11), (12), (12'), or (12'') below.

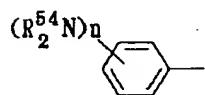
General formula (7)



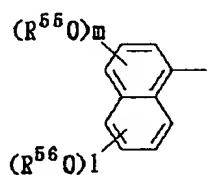
General formula (8)



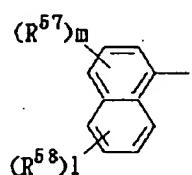
General formula (9)



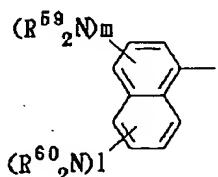
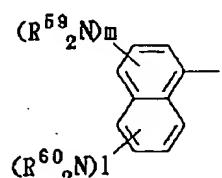
General formula (10)



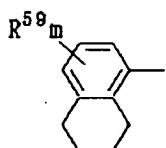
General formula (11)



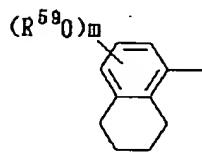
General formula (12)



General formula (12')



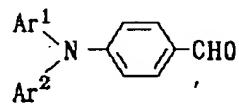
General formula (12")



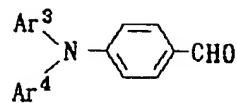
(where R⁵², R⁵³, and R⁵⁴ each denotes a saturated or unsaturated hydrocarbon group having one or more carbons; R⁵⁵, R⁵⁶, R⁵⁷, R⁵⁸, R⁵⁹, and R⁶⁰ are identical or different, each denoting a saturated or unsaturated hydrocarbon group having one or more carbons; n is an integer of 0 to 6; m is an integer of 0 to 3; and l is an integer of 0 to 4.)

said process comprising condensing at least one species of 4-(N,N-diaryl amino)benzaldehyde represented by the general formula (33) or (34) below with diphosphonic ester represented by the general formula (37) below or diphosphonium represented by the general formula (38) below.

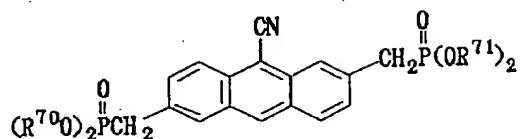
General formula (33)



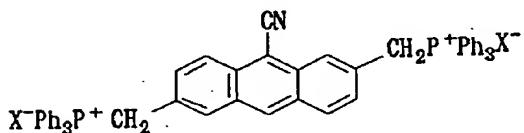
General formula (34)



General formula (37)



General formula (38)



(where Ar¹, Ar², Ar³, Ar⁴, R⁷⁰, R⁷¹ and X are defined as above.)

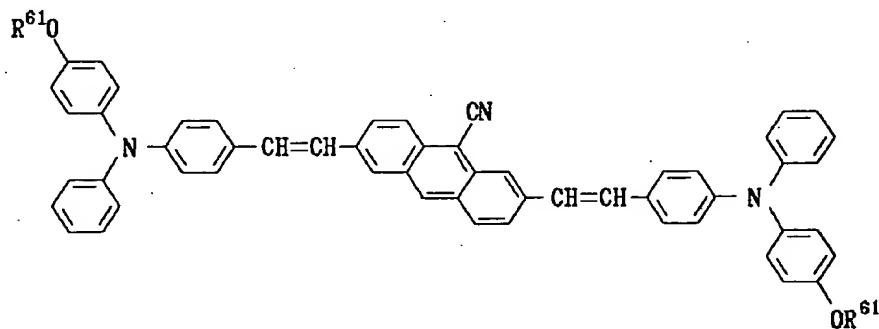
22. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 21, wherein R⁷⁰ and R⁷¹ each denotes a saturated hydrocarbon group having 1 to 4 carbon atoms.

23. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 21, wherein R⁵², R⁵³, R⁵⁴, R⁵⁵, R⁵⁶, R⁵⁷, R⁵⁸, R⁵⁹, and R⁶⁰ each has 0 to 6 carbon atoms.

DOCUMENT # 7509360

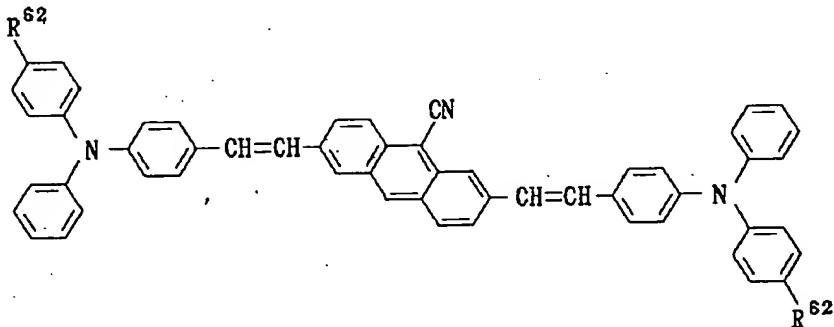
24. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 14 or 21, said process yielding a bis(aminostyryl)anthracene compound represented by the general formula (20), (21), (22), (23), (24), (24') or (24'') below.

General formula (20)



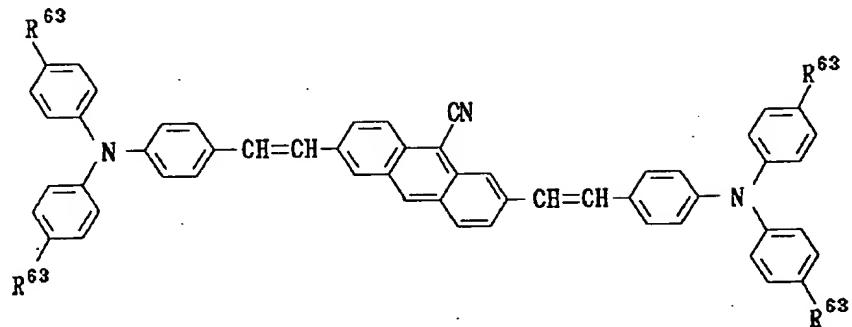
(where R⁶¹ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (21)



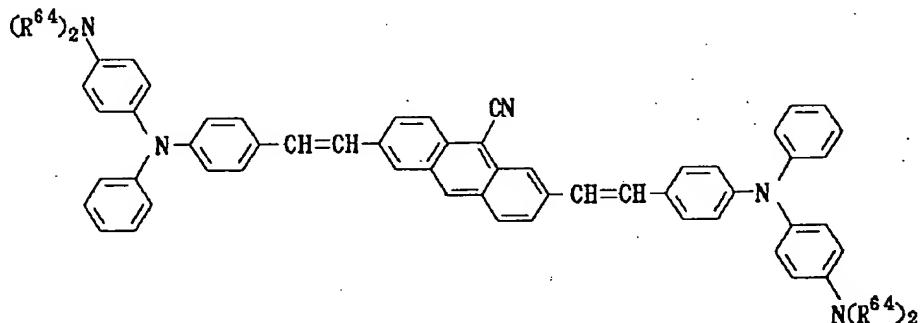
(where R⁶² denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (22)



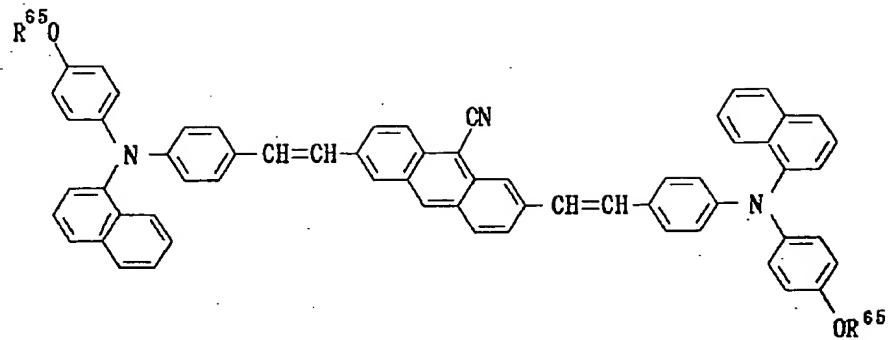
(where R⁶³ denotes a saturated or unsaturated hydrocarbon group or hydrocarbon oxy group having 1 to 6 carbon atoms.)

General formula (23)



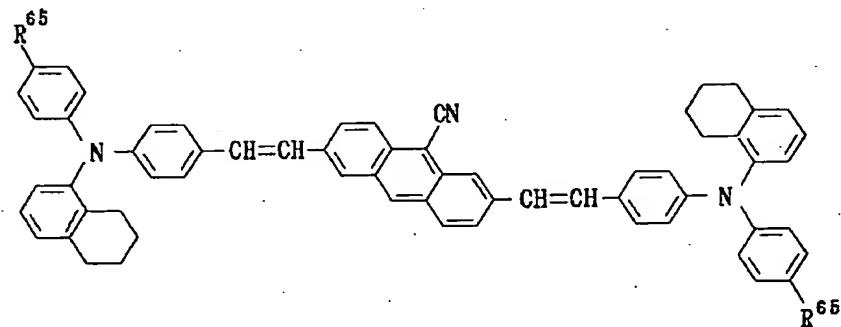
(where R⁶⁴ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (24)



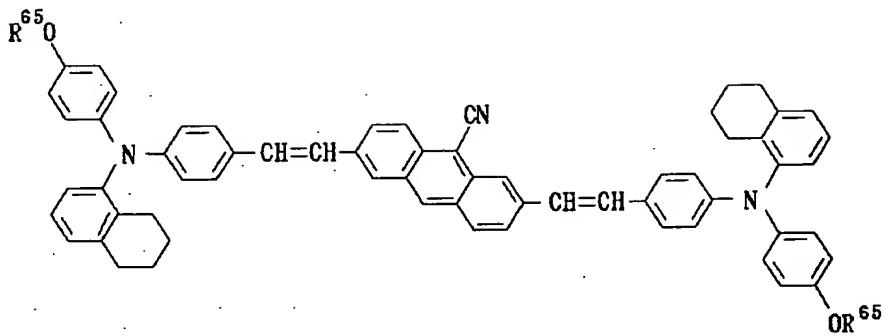
(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (24')



(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

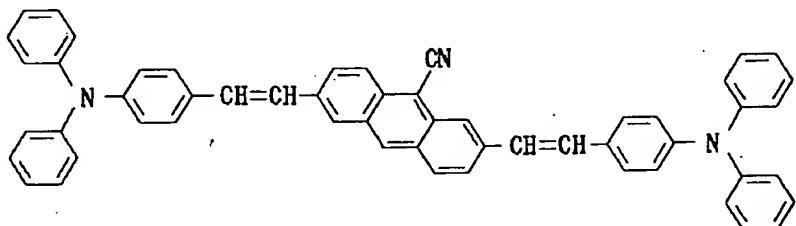
General formula (24'')



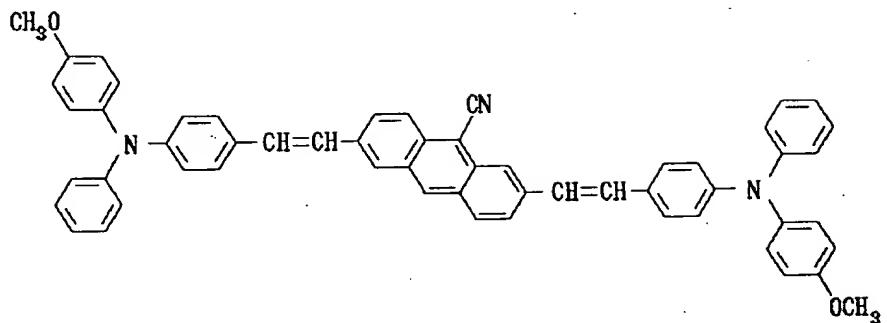
(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

25. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 14 or 21, said process yielding a bis(aminostyryl)anthracene compound represented by the structural formula (25)-1, (25)-2, (25)-2', (25)-3, (25)-4, (25)-5, (25)-6, (25)-6', (25)-7, (25)-8, (25)-9, (25)-10, (25)-10', (25)-10'', or (25)-11 below.

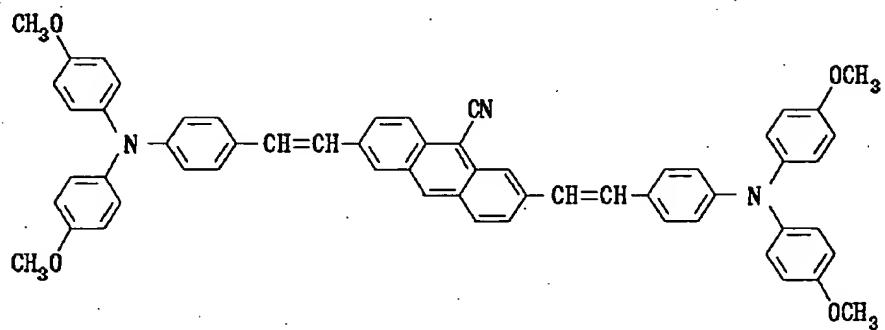
Structural formula (25)-1



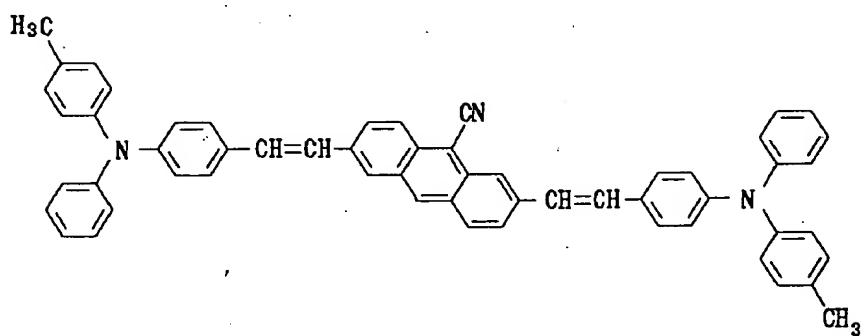
Structural formula (25) - 2



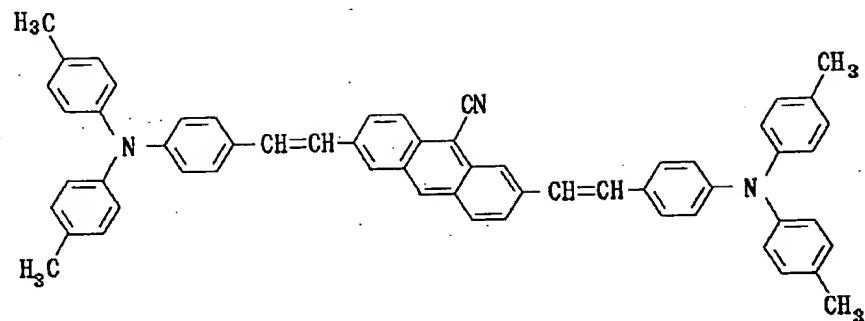
Structural formula (25) - 2'



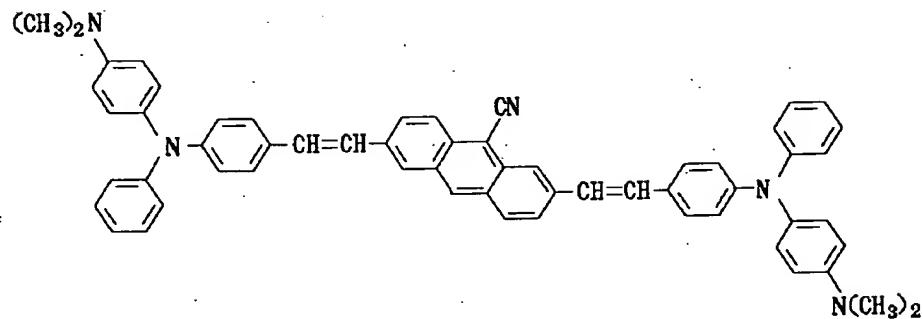
Structural formula (25) - 3



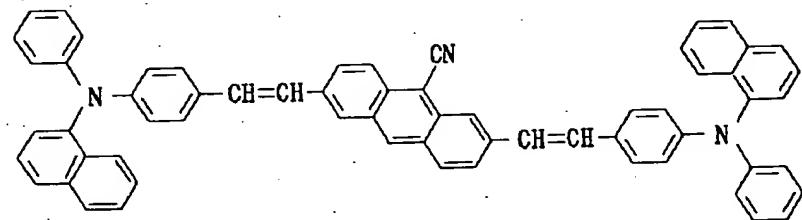
STRUCTURAL FORMULA (25) - 4



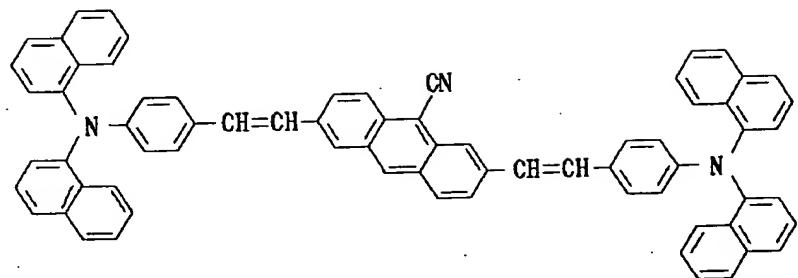
STRUCTURAL FORMULA (25) - 5



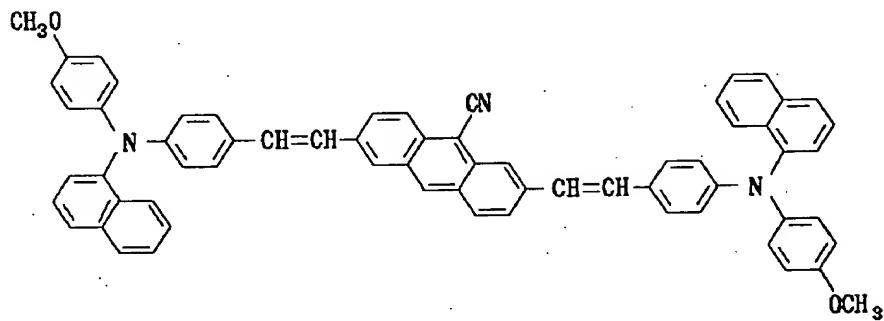
STRUCTURAL FORMULA (25) - 6



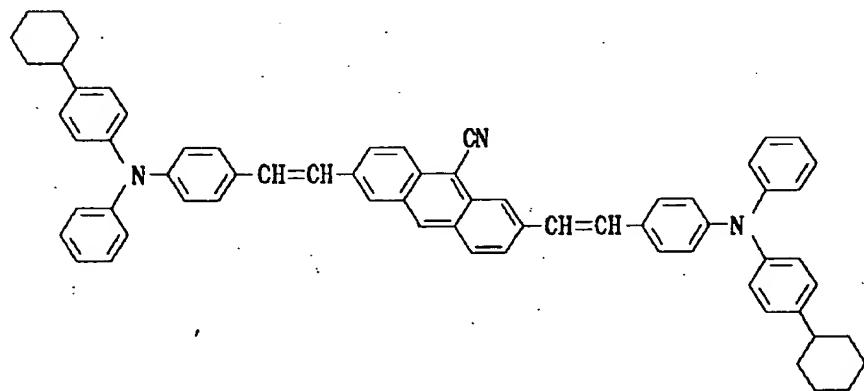
Structural formula (25) - 6'



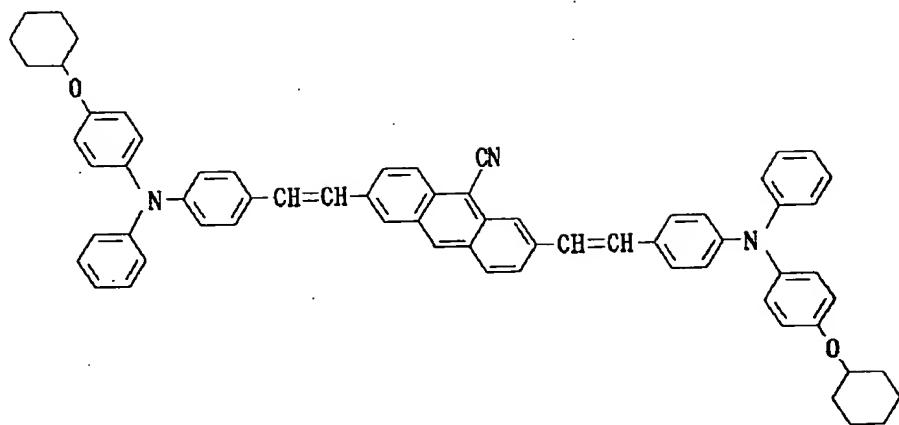
Structural formula (25) - 7



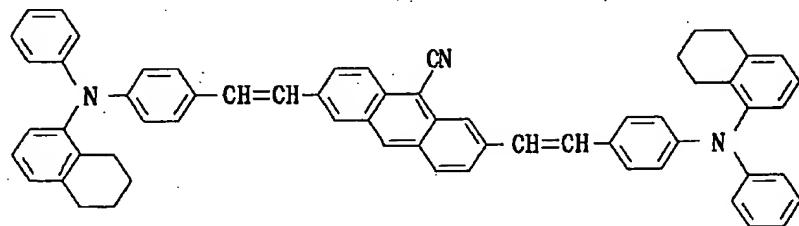
Structural formula (25) - 8



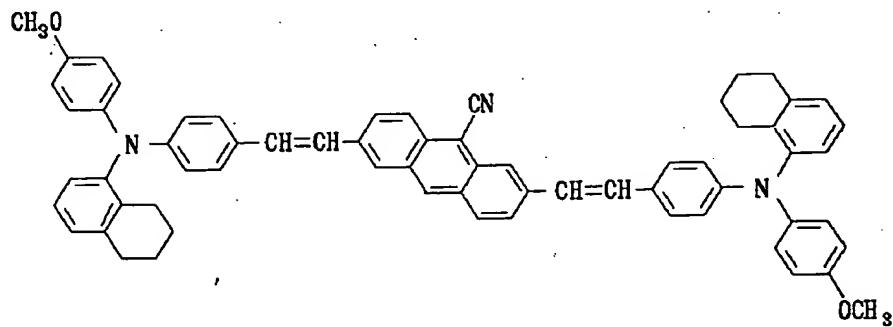
Structural formula (25)-9



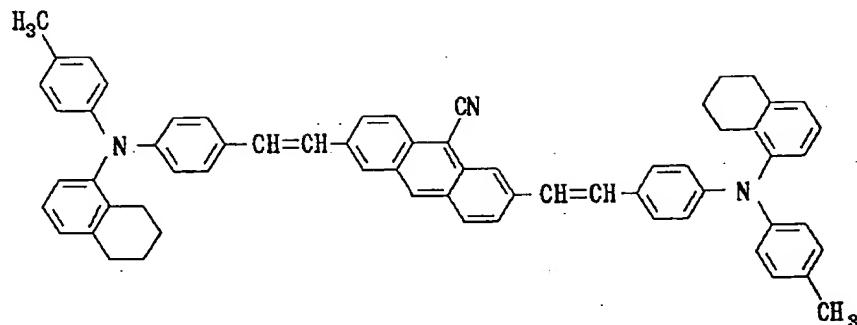
Structural formula (25)-10



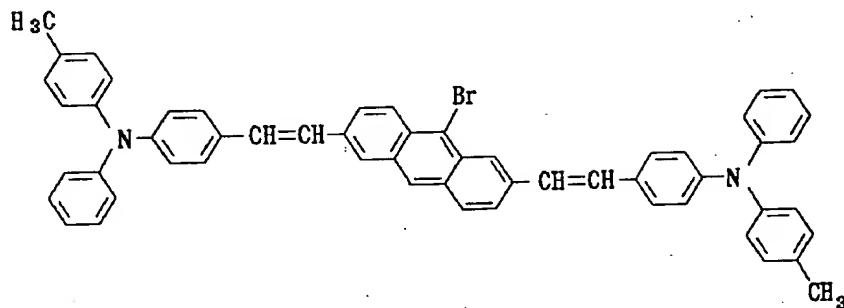
Structural formula (25)-10'



Structural formula (25)-10"

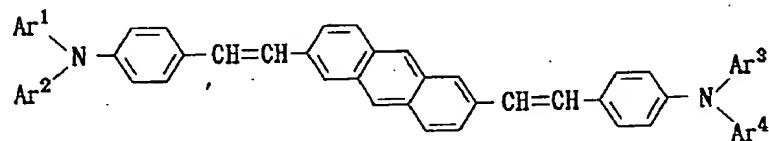


Structural formula (25)-11



26. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 14, wherein said bis(aminostyryl)anthracene is represented by the general formula (26) below.

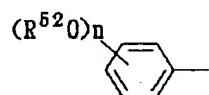
General formula (26)



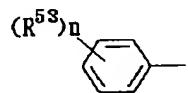
(where Ar¹, Ar², Ar³, and Ar⁴ are identical or different,

each denoting an aryl group which may have a substituent, and if a substituent is present, said aryl group being one which is selected from aryl groups represented by the general formula (7), (8), (9), (10), (11), (12), (12'), or (12'') below.

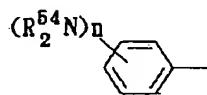
General formula (7)



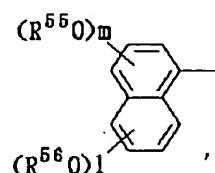
General formula (8)



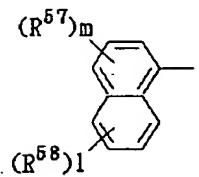
General formula (9)



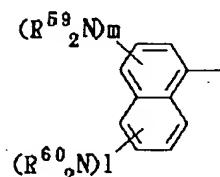
General formula (10)



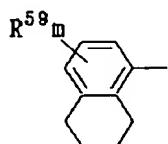
General formula (11)



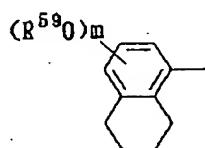
General formula (12)



General formula (12')



General formula (12'')

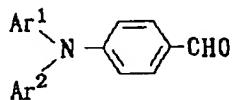


(where R^{52} , R^{53} , and R^{54} each denotes a saturated or unsaturated hydrocarbon group having one or more carbons; R^{55} , R^{56} , R^{57} , R^{58} , R^{59} , and R^{60} are identical or different, each denoting a saturated or unsaturated hydrocarbon

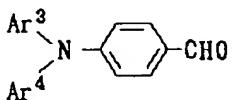
group having one or more carbons; n is an integer of 0 to 6; m is an integer of 0 to 3; and l is an integer of 0 to 4.)

said process comprising condensing at least one species of 4-(N,N-diaryl amino)benzaldehyde represented by the general formula (33) or (34) below with diphosphonic ester represented by the general formula (39) below or diphosphonium represented by the general formula (40) below.

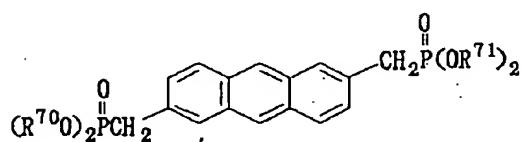
General formula (33)



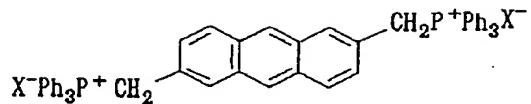
General formula (34)



General formula (39)



General formula (40)



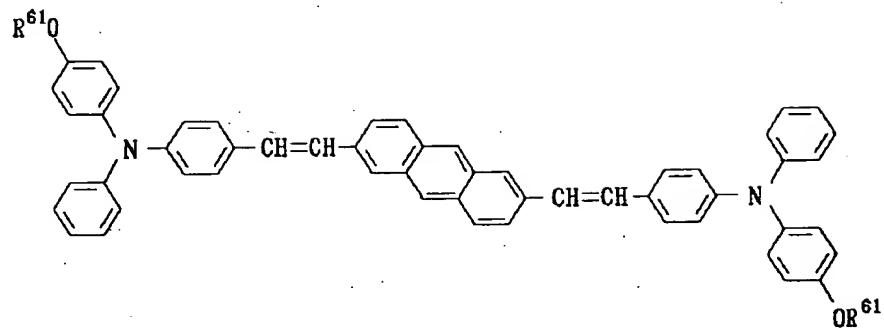
(where Ar¹, Ar², Ar³, Ar⁴, R⁷⁰, R⁷¹ and X are defined as above.)

27. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 26, wherein R⁷⁰ and R⁷¹ each denotes a saturated hydrocarbon group having 1 to 4 carbon atoms.

28. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 26, wherein R⁵², R⁵³, R⁵⁴, R⁵⁵, R⁵⁶, R⁵⁷, R⁵⁸, R⁵⁹, and R⁶⁰ each has 1 to 6 carbon atoms.

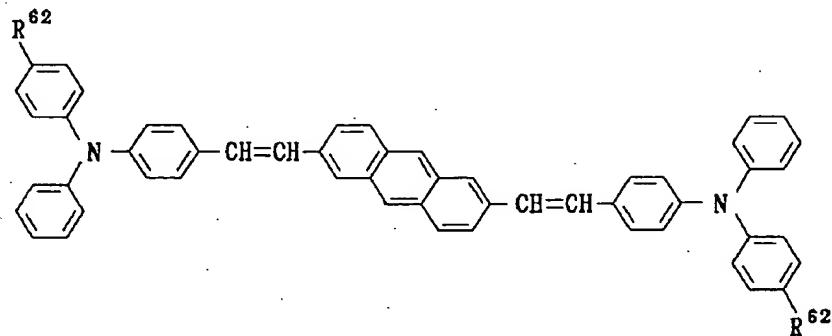
29. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 14 or 26, said process yielding a bis(aminostyryl)anthracene compound represented by the general formula (27), (28), (29), (30), (31), (31') or (31") below.

General formula (27)



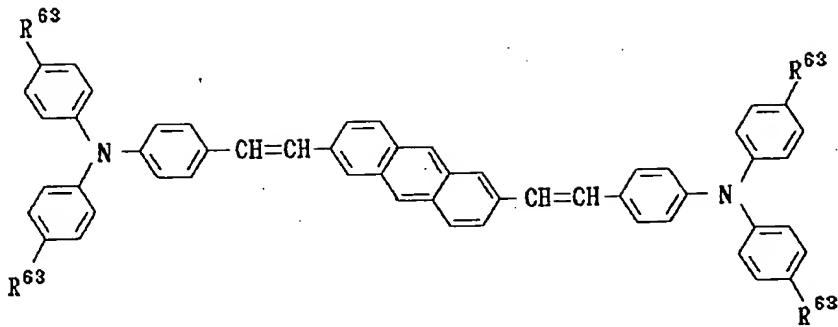
(where R^{61} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (28)



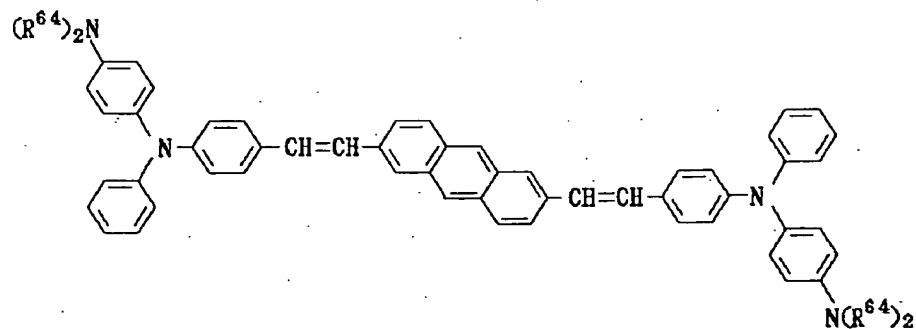
(where R^{62} denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (29)



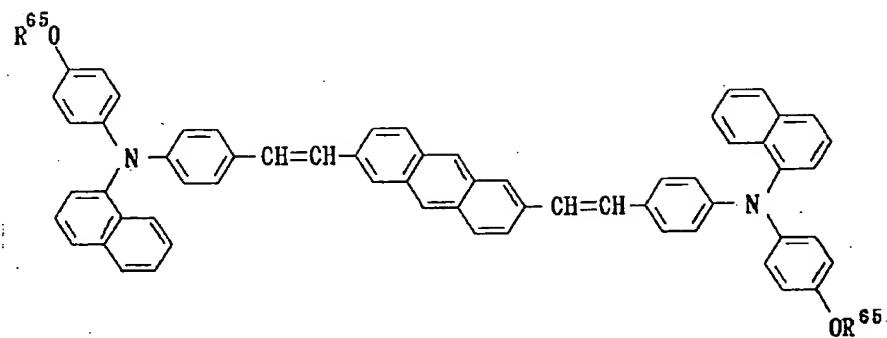
(where R⁶³ denotes a saturated or unsaturated hydrocarbon group or hydrocarbon oxy group having 1 to 6 carbon atoms.)

General formula (30)



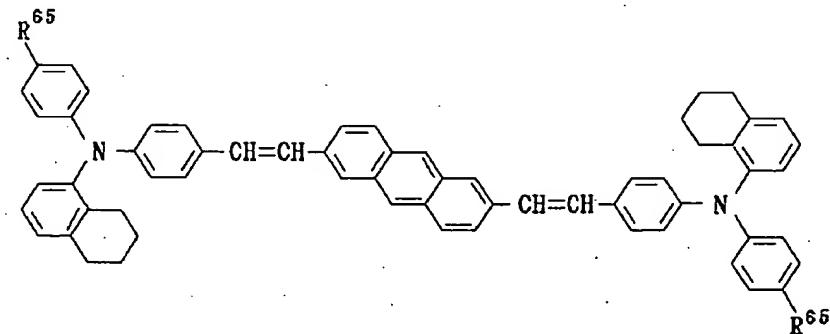
(where R⁶⁴ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (31)



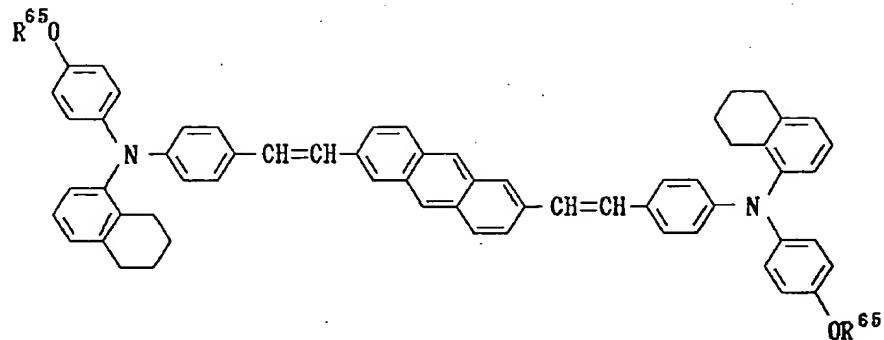
(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

General formula (31')



(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

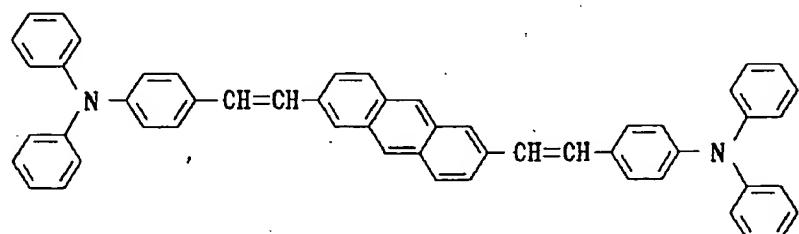
General formula (31")



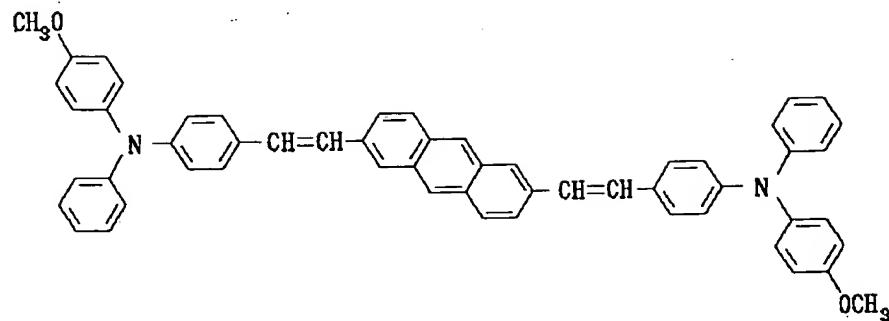
(where R⁶⁵ denotes a saturated or unsaturated hydrocarbon group having 1 to 6 carbon atoms.)

30. A process for producing a bis(aminostyryl)anthracene compound as defined in Claim 14 or 26, said process yielding a bis(aminostyryl)anthracene compound represented by the structural formula (32)-1, (32)-2, (32)-2', (32)-3, (32)-4, (32)-5, (32)-6, (32)-6', (32)-7, (32)-8, (32)-9, (32)-10, (32)-10', or (32)-10" below.

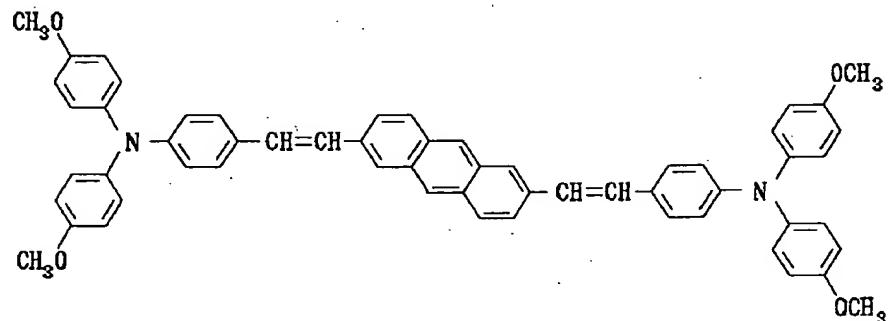
Structural formula (32)-1



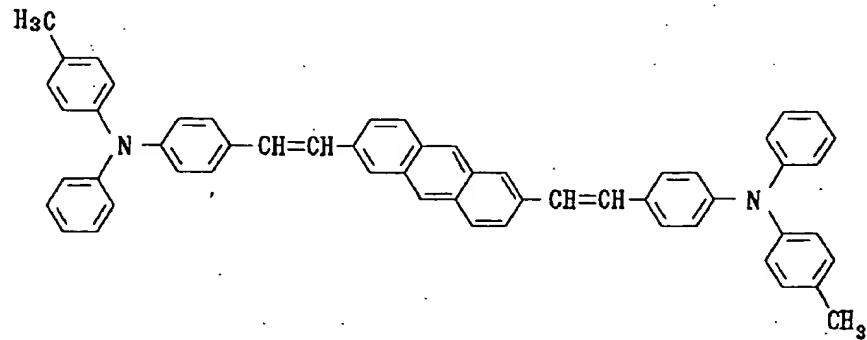
Structural formula (32) - 2



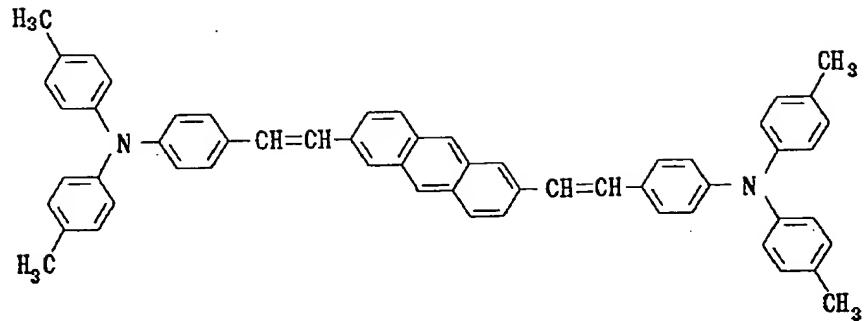
Structural formula (32) - 2'



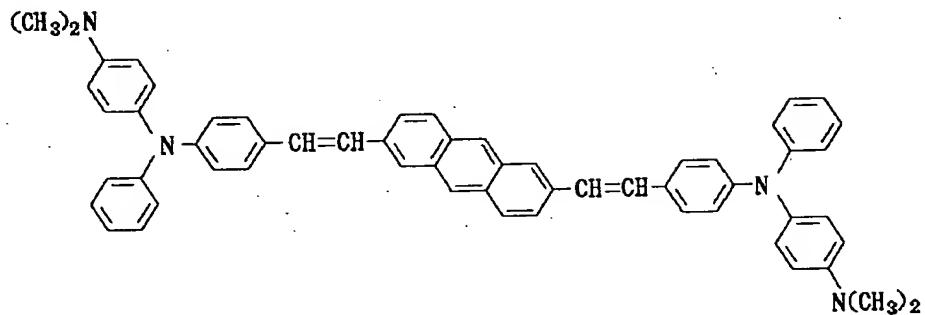
Structural formula (32) - 3



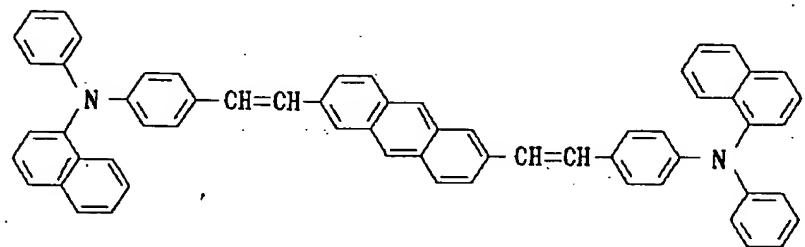
Structural formula (32) - 4



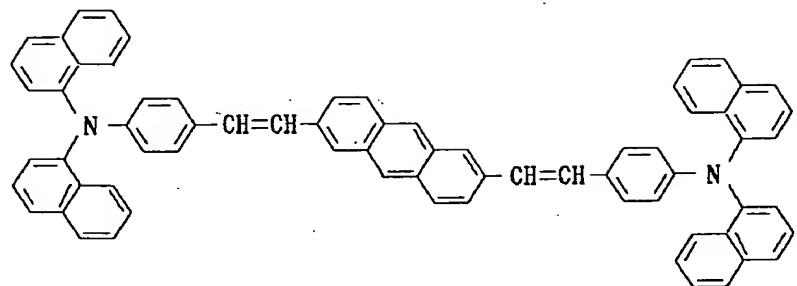
Structural formula (32) - 5



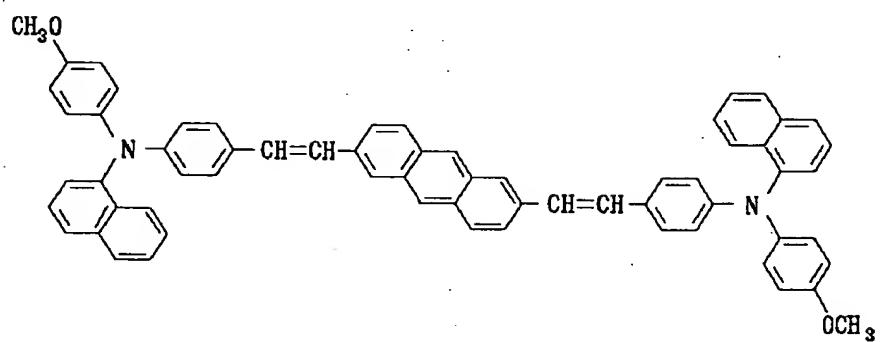
Structural formula (32) - 6



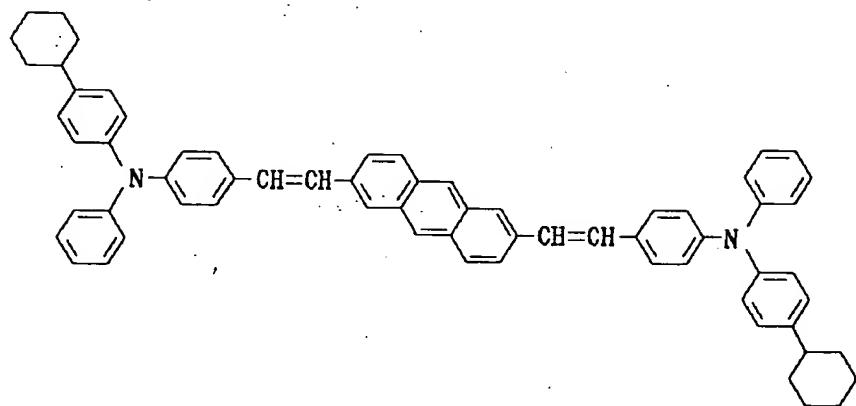
Structural formula (32) - 6'



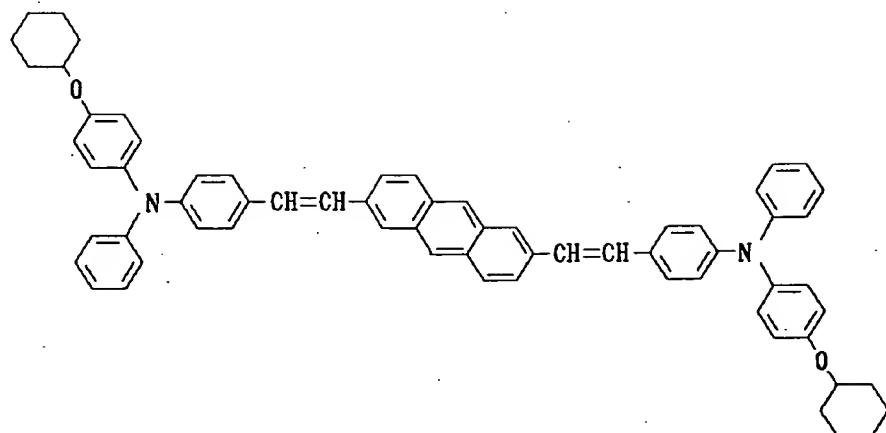
Structural formula (32) - 7



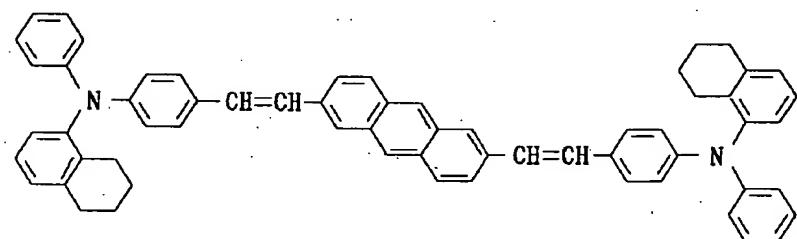
Structural formula (32) - 8



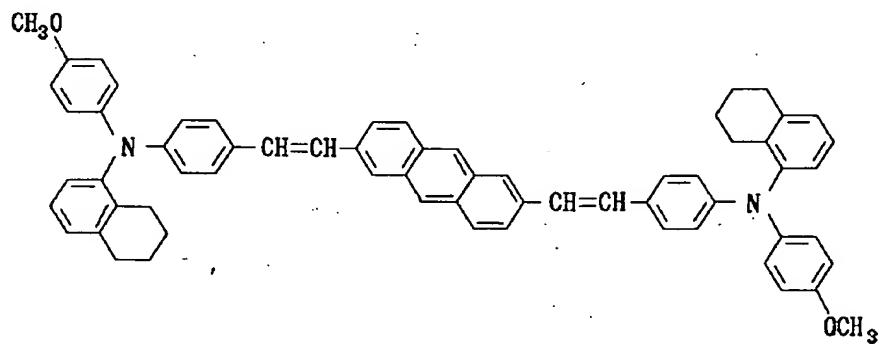
Structural formula (32)-9



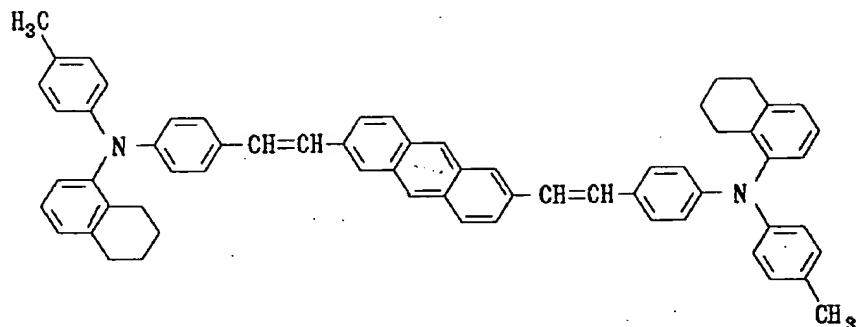
Structural formula (32)-10



Structural formula (35)-10'

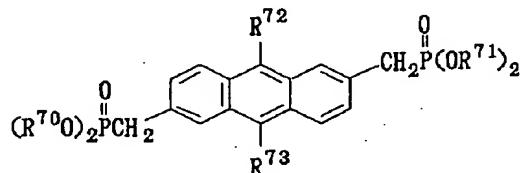


Structural formula (32) - 10"

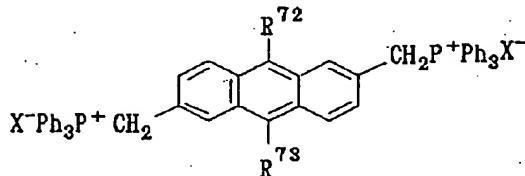


31. A diphosphonic ester or diphosphonium represented by the general formula [VII] or [VIII] below.

General formula [VII]



General formula [VIII]



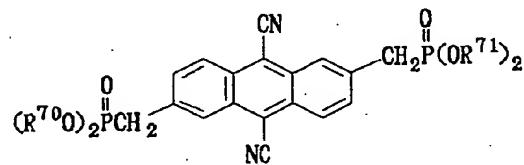
(where R⁷⁰ and R⁷¹, are identical or different, each denoting a hydrocarbon group; R⁷² and R⁷³ are identical or different, at least one of them denoting a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or

halogen atom, and X denotes a halogen atom.)

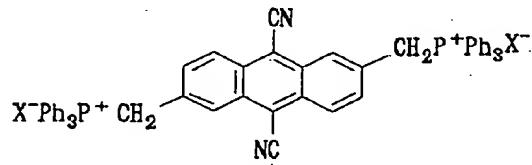
32. A diphosphonic ester or diphosphonium as defined in Claim 31, wherein R⁷⁰ and R⁷¹ each denotes a saturated hydrocarbon group having 1 to 4 carbon atoms.

33. A diphosphonic ester or diphosphonium as defined in Claim 31, which is represented by the general formula (35) or (36) below.

General formula (35)



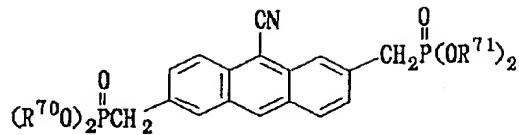
General formula (36)



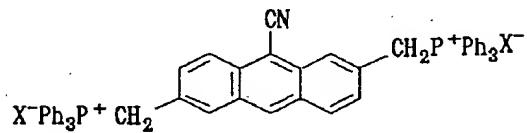
(where R⁷⁰, R⁷¹, and X are defined as above.)

34. A diphosphonic ester or diphosphonium as defined in Claim 31, which is represented by the general formula (37) or (38) below.

General formula (37)



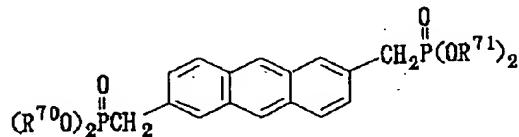
General formula (38)



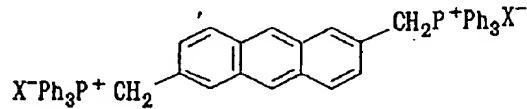
(where R⁷⁰, R⁷¹, and X are defined as above.)

35. A diphosphonic ester or diphosphonium as defined in Claim 31, which is represented by the general formula (39) or (40) below.

General formula (39)



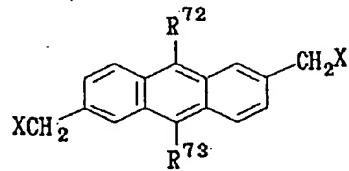
General formula (40)



(where R⁷⁰, R⁷¹, and X are defined as above.)

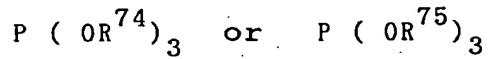
36. A process for producing a diphosphonic ester or diphosphonium represented by the general formula [VII] or [VIII] below, said process comprising reacting an aryl halide compound represented by the general formula [IX] below and a trialkyl phosphite represented by the general formula [X] below or triphenyl phosphine (PPh_3).

General formula [IX]



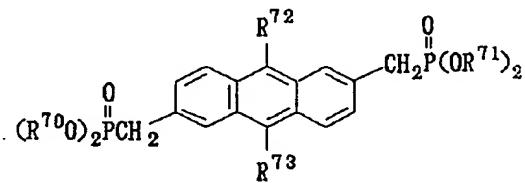
(where R^{72} and R^{73} are identical or different, at least one of them denoting a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom, and X denotes a halogen atom.)

General formula [X]

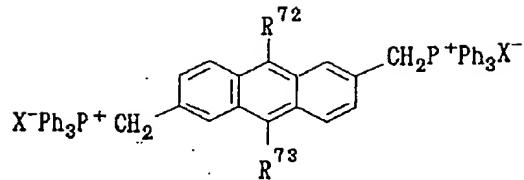


(where R^{74} and R^{75} are identical or different, each denoting a hydrocarbon group.)

General formula [VII]



General formula [VIII]

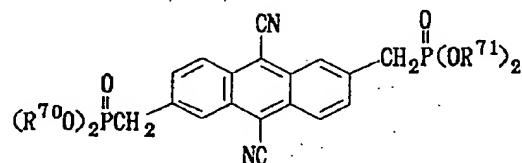


(where R⁷⁰ and R⁷¹ are identical or different, each denoting a hydrocarbon group; and R⁷², R⁷³, and X are defined as above.)

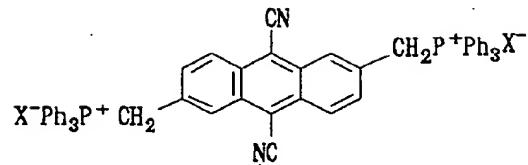
37. A process for producing a diphosphonic ester or diphosphonium as defined in Claim 36, wherein R⁷⁰ and R⁷¹ each denotes a saturated hydrocarbon group having 1 to 4 carbon atoms.

38. A process for producing a diphosphonic ester or diphosphonium as defined in Claim 36, said process yielding a diphosphonic ester or diphosphonium represented by the general formula (35) or (36).

General formula (35)



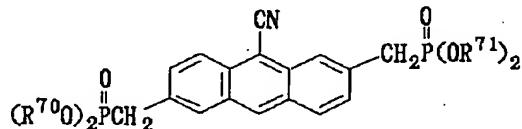
General formula (36)



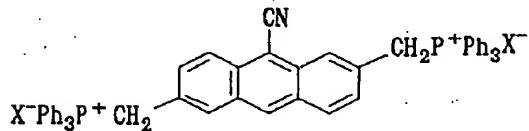
(where R⁷⁰, R⁷¹, and X are defined as above.)

39. A process for producing a diphosphonic ester or diphosphonium as defined in Claim 36, said process yielding a diphosphonic ester or diphosphonium represented by the general formula (37) or (38).

General formula (37)



General formula (38)

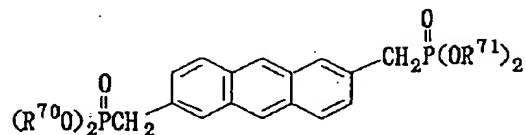


(where R⁷⁰, R⁷¹, and X are defined as above.)

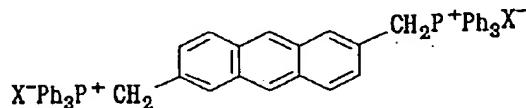
40. A process for producing a diphosphonic ester or diphosphonium as defined in Claim 36, said process yielding a diphosphonic ester or diphosphonium

represented by the general formula (39) or (40).

General formula (39)



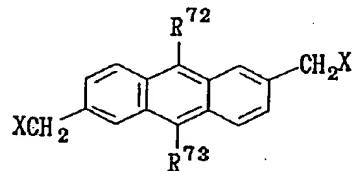
General formula (40)



(where R^{70} , R^{71} , and X are defined as above.)

41. An aryl halide compound represented by the general formula [IX] below.

General formula [IX]

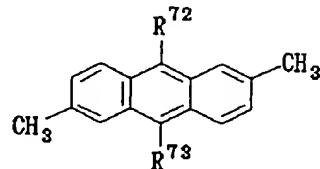


(where R^{72} and R^{73} are identical or different, at least one of them denoting a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

42. A process for producing an aryl halide compound represented by the general formula [IX] below, said process comprising reacting an anthracene compound

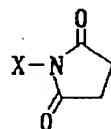
represented by the general formula [XI] below with an N-halogenated succinimide represented by the general formula [XII] below.

General formula [XI]



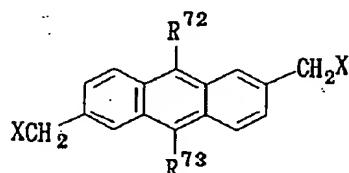
(where R^{72} and R^{73} are identical or different, at least one of them denoting a hydrogen atom, cyano group, nitro group, trifluoromethyl group, or halogen atom.)

General formula [XII]



(where X denotes a halogen atom.)

General formula [IX]



(where R^{72} and R^{73} are defined as above, and X denotes a halogen atom.)